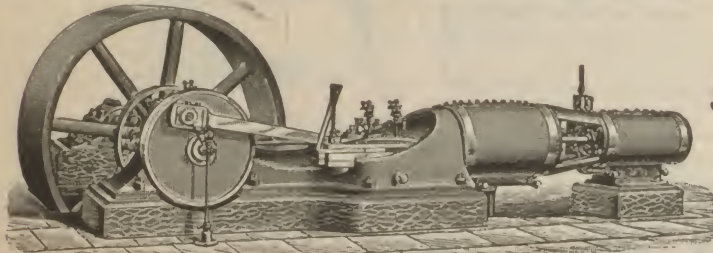


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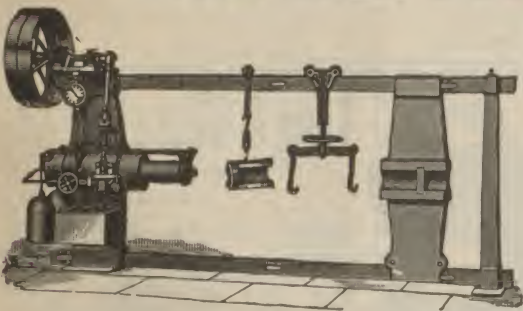


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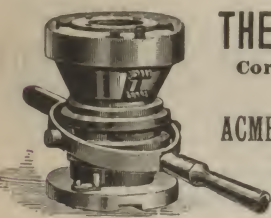
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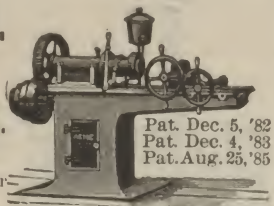
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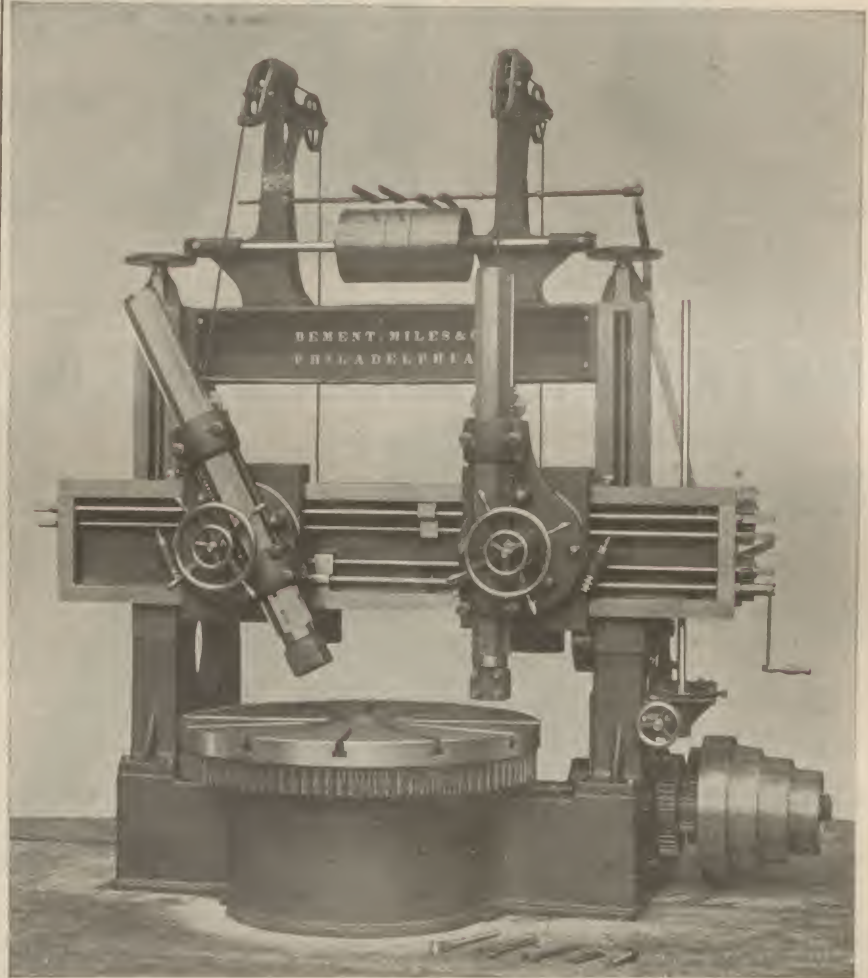
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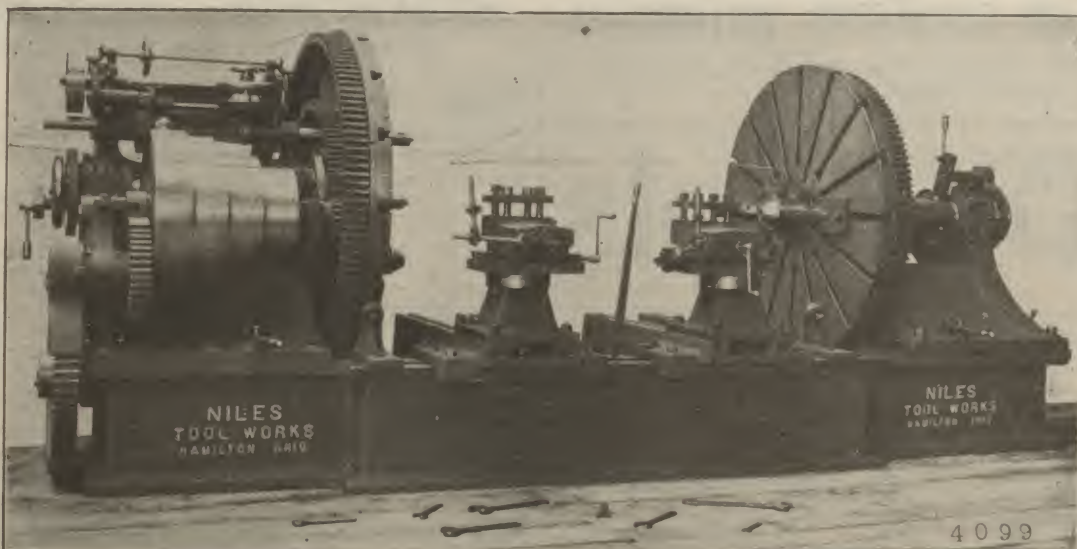
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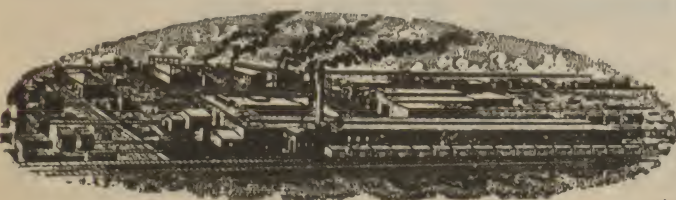
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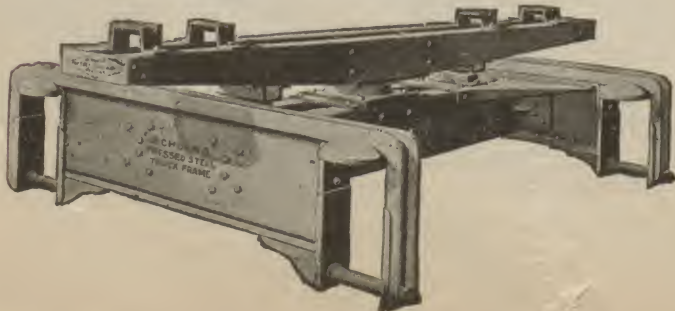
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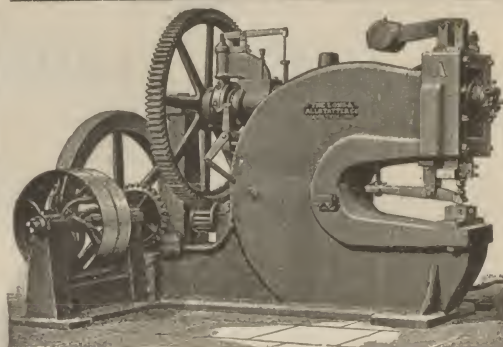
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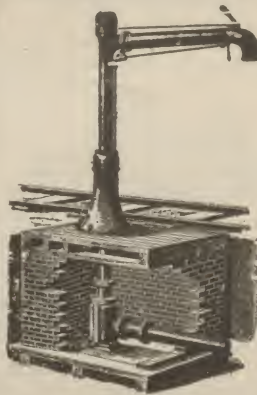
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THE RAILWAY REVIEW

XXXVI.

APRIL 11, 1896.

No. 15.

WELDING BY PRESSURE.—The experiments in welding metallic bodies by simple pressure at heats below their fusing points, made by the Royal Society of Belgium, show that the most perfect joints are obtained with gold, lead and tin, and the worst with bismuth and antimony. Cylinders of extremely pure metal with smooth surfaces were brought together by a hand screw and kept at a constant temperature between 200 deg. and 400 deg. for from three to twelve hours. When separated the break did not coincide with the jointed surfaces. Platinum was softened and welded at a temperature of 1,600 deg. below its point of fusion.

FIRE PROOF PAPER.—An account of the new fire proof paper prepared by L. Froben of Berlin shows the production of a valuable article for industrial and other purposes. Ninety-five parts of asbestos fiber of the best quality are washed in a solution of permanganate of calcium and then treated with sulphuric acid, the fiber being thus bleached. After treating the fiber in this manner five parts of ground wood pulp are added, and the entire mass placed in the agitating box, with an addition of some lime water and borax. After being thoroughly mixed the material is pumped into a regulating box and allowed to flow out of a gate into an endless wire cloth, where it enters the usual paper making machinery. Paper produced in this way, it is reported, will resist even the direct influence of a flame, and may be placed in a white heat with impunity. Ordinary paper may be made fire proof by treating it with a fluid consisting of thirty-three parts manganate of chloride, twenty parts of orthophosphoric acid, twelve parts of carbonate of magnesia, ten parts boric acid, and twenty-five parts chloride of ammonia in one quart of water; this solution is applied several times, and paper saturated with it will resist great heat and the direct influence of flame for some time.

X RAY PICTURES AS EVIDENCE.—A recent dispatch from London stated that the court of appeals of the supreme court in judicature, the highest judicial tribunal in England, is to pass upon the legality of admitting as evidence testimony based upon the application of the Roentgen rays, and its decision will be of moment to the medical and legal fraternity throughout the world, inasmuch as an affirmative judgment would be tantamount to legalizing the new discovery as competent evidence in litigation, and would establish a precedent that would doubtless be followed in other countries. The case will come before the court in the form of an appeal by the Nottingham Theater Company, which was recently mulcted in \$5,000 damages in the suit of Gladys Ffolliott, an actress, who sustained injuries by falling through a dilapidated stairway in the theater. The plaintiff's case was weak until the production of negatives of her left foot, taken by Prof. Ramsey by means of the new rays, which clearly demonstrated that the bones of the foot had been seriously displaced. With this evidence before it, the jury promptly gave her a verdict and the theater company appealed. This is the first time that testimony based upon the X rays has been offered in court, and the fact that it was admitted by Justice Hawkins, whose decisions have invariably been sustained, may be taken as foreshadowing the ultimate conclusion of the court of appeals.

TRANS-OCEANIC TOWAGE.—An ocean tank barge is to be tested by the Standard Oil Company in a trip across the Atlantic, says Engineering News. Two similar barges have been towed between Atlantic ports for several years with encouraging financial success. The company now proposes to tow its barge No. 58 to Liverpool, or some other English port. No. 58 is a steel tank barge, with four masts, schooner rigged, as the sails are sometimes used to assist the towing steamer. The barge is 250 ft. long by 40 ft. beam and draws 16½ ft. of water. The oil is carried in 12 separate tanks, each holding about 1,250 barrels, or an aggregate of 750,000 gallons. The English tank steamship Lackawanna, owned by the English branch of the Standard Oil Company, will probably do the towing, and carry in her own tanks 1,800,000 gallons of oil besides. The barge is fitted with steam towing machinery, steam steering gear, windlass and hoister. Vessels have already been towed from New York to the West Indies, and a floating dry dock was towed, some years ago, from England to Bermuda.

BORING A SQUARE HOLE.—Probably every mechanic has been asked at some time or other if he could "bore a square hole." To do this with an ordinary augur bit or a good twist drill seems rather paradoxical, but, in fact, says Tradesman it is an easy operation. Having duly wagered the cigars or a new hat, etc., proceed to prepare for work, by selecting a bit with a square end, that is, where the lips do not cut lower or higher than the center. A center bit is a very good tool for this purpose. Procure two pieces of wood having one square corner each. Select a piece of paper, fold it neatly and lay it between the pieces of wood, so that each shall come fair with each other. Screw up the whole business in a vice, the paper being between the wood and the center of the bit upon the folded edge of paper, and bore neatly into edge of both boards a distance equal to one-half of the diameter of the bit. When the concern is taken out of the vice there will be found to be a half round hole in each piece of wood and where the paper is unfolded it will show a square hole of more or less perfect section according to the care taken by the mechanic in boring the hole.

CRYSTALLIZED CARBON.—A peculiar piece of crystallized carbon, which in a general way resembles the black diamond, was recently submitted to the French Academy of Sciences by Moisson, the well known chemist. This piece of carbon, which was found in the province of Bahia, Bra-

zil, weighs over one pound and is of partly crystalline, partly amorphous nature. The latter places appear under a microscope honey-combed by little holes or channels, such as are found in lava or slag, producing the impression as if gases had escaped out of the mass while in liquid condition. Moisson declared that the specimen submitted was a link, unknown so far, between graphite and diamond.

DOING WORK RIGHT.—There is one lesson which some mechanics, especially contractors, seem entirely unable to learn, says the Tradesman. It is the method of doing work right the first time. Invariably these men persist in doing some work in a manner which requires it to be undone and again accomplished in a different manner. The utter foolishness of such a course would seem to be enough to deter any man from making that blunder a second time. Why they will do it is a problem in mechanics as yet unsolved, yet in daily evidence in almost every shop in the country. It only requires a little thought at the beginning to enable a man to steer clear of all these obstructions, and certainly the cash account of the two methods needs very little consideration to determine which is the better. Let the young mechanic write at the head of his note book, "Do the thinking on this job before commencing the work."

APYRITE.—A peculiar kind of mineral, containing about 93 per cent of silica and consequently very refractory, is being worked in Bavaria. The mineral, which is called apyrite, when mixed with water forms a plastic and adhesive mass which, after dessiccation, becomes firm and resisting, while its volume does not change when exposed to the fire; moreover, it is scarcely attacked by metals and scoria in fusion, which either do not stick to the surfaces made with it or are easily removed without the least detriment to the furnace. In the neighborhood of the mines apyrite tempered with water is used instead of lime mortar, and also for plastering. Slightly damped the substance is panned so as to supersede fire brick lining, as in the case of various furnaces, and a large foundry cupola can thus be lined in a day by two men, such a lining lasting longer than one of the same substance made up into bricks; then, too, for repairs to the fire work lining of furnaces the article is found to be very useful.

GLASS BRICKS.—Some samples of Talcomnier's blown glass bricks have been received at the Franklin Institute and have been attracting much attention. Mention of these was made in our issue of October 12, 1895. They should not be confounded with the solid blocks of glass formerly used with little success for similar purposes. Talcomnier's blown glass bricks are very light and very strong. They are, in fact, hollow chambers, so shaped as to facilitate their being put together like other building blocks, and are laid so as to present an ornamental appearance. Made in this fashion the bricks fill successfully the part of double windows with an air chamber incased in a double glass wall, and they are consequently an efficient preservation against cold as well as against heat, and good insulators of dampness and noise. The bricks are hermetically sealed while yet hot, thereby preventing foreign substances or dust from soiling the interior, and they are then annealed to increase their powers of resistance. The laying of the bricks is plain bricklayers' work, the vaults being constructed over a center of wood, heavy lime mortar or light cement mixed with fine sand being used after the whole width of the joint around the brick has been covered with a layer of sizing of a light tint that can be varied according to taste, so as to obtain nice effects of changing colors if desired. The glass bricks, it is said, are used with good results in the construction of green-houses and conservatories, as they retain the stored heat for a long time; consequently a considerable economy of fuel is realized.

STEEL WOOL.—The interesting product "steel wool" is tended for use in all cases where sandpaper, emery paper, pumice stone and materials of a kindred nature are employed, is noticed in the Railroad Gazette. In bulk it resembles both in appearance and to the touch the hair commonly used for stuffing mattresses and chairs. The ordinary by-product known as steel shavings has for many years been used for rough work, in which the coarser grades of sandpaper are used; but the objections to the use of these shavings for the finer work of rubbing down varnish or paint on woods and for polishing metals were the harshness of and the lack of uniformity in the threads and the edges of the shavings being very sharp, thereby cutting, instead of polishing, and being of many different sizes and shapes, would leave an uneven surface. The idea of making a machine to overcome these difficulties originated years ago in Switzerland with an observing German, who noticed painters gathering the refuse derived from the manufacture of reed for looms and picking therefrom the finer grades for use in rubbing down wood and metal work generally. Upon examination he found that this residue consisted of flat ribbons of steel, the borders of which were planed off, and before being assorted was an admixture of fine and coarse grades. He readily discovered two defects in the material thus obtained; first, it was impossible to obtain any appreciable quantity of a uniform grade, and, secondly, the temper and quality of the steel was such that only indifferent results could be obtained from its use. Eventually he built a machine for the manufacture of shredded steel or steel threads uniformly fine in quality but still retaining sufficient cutting propensities, and so delicate in texture, that instead of steel shavings he called it steel wool. Then by carefully studying the temper and quality of steel best adapted to his needs, he was enabled to perfect the product. The advantages claimed for steel wool are that it cuts more quickly and uniformly than sandpaper, does not clog or gum, and, being both flexible and perfectly homogeneous, adapts itself readily to the shapes of carvings and moldings. The process is patented in Germany only by August Buhne & Co., whose sole agent of the product for the United States, Canada, Mexico and Japan is Aquila Rich & Co., 70 Maiden Lane, New York. Steel wool is used for car and locomotive work by the Pennsylvania, Southern, Fitchburg, Concord & Montreal, Buffalo, Rochester & Pittsburg and other railroads and the Wagner Palace Car Co. Many imitations have been placed on the

market which have the faults of the finer grades of common steel shavings mentioned in the first part of this article.

MAKING TIGHT PETROLEUM JOINTS.—Many have supposed it to be quite impossible to make a petroleum joint that would not leak, especially with the light varieties, such as naphtha and gasoline, when subjected to both heat and pressure. However, as a matter of fact, it is no more difficult to make a petroleum proof joint than a water proof joint. In making up steam or water joints we naturally employ something which is insoluble in water. If an ordinary steam or gas fitter is asked to make a petroleum tight connection he is sure to employ red lead and oil, and for a gasket or washer he is equally sure to use india rubber, both oil and india rubber being quite soluble in petroleum. In my experience I find that a joint which is screwed together dry is less apt to leak petroleum than joint made up of the orthodox red lead and oil. To make a good petroleum joint with common iron pipes a very good system is to heat both the male and female threads sufficiently to dissipate every trace of oil; then make the joint up with thick shellac varnish, which may be combined with ordinary dry vermilion, or even venetian red. A joint of this kind I have found to stand well. A very good joint can also be made with ordinary yellow bar soap rubbed into the threads of the pipe, the grease first being removed. Treacle, honey, glue, mucilage, or glycerine are quite petroleum proof. For a stuffing box ordinary wicking saturated with common yellow bar soap may be safely employed. Canvassaturated with shellac varnish makes a good washer, but soft metallic washers are better. A very good metallic diaphragm for a regulator may be made of closely woven cotton fabric varnished on both sides with a compound of gelatine and glycerine. About equal parts by weight make a very tough and elastic compound. Wooden vessels, bags, etc., may also be made petroleum-tight by saturating or varnishing with this compound. As a rule all substances which are soluble in water are quite insoluble in petroleum. For stuffing-boxes for standing both water and petroleum castor oil may be employed, as this peculiar oil seems quite insoluble in either water or petroleum.—[Hiram S. Maxim in Engineer (London).]

CATTLE SHIPMENTS FROM GULF PORTS.—The shipping of live cattle to foreign markets via New Orleans bids fair to become very extensive, as well as a permanent business. On March 20 the steamships Louisianian and Floridian loaded 244 head for Liverpool. These ships, in ordinary weather, will make the run in about sixteen days. Their equipment for the business is practically perfect. The cattle, which are an exceptionally fine lot, came from Dallas, Tex. They were raised in the northeastern portion of the state. They were sent by way of the Texas & Pacific road in a special stock train.

CRYSTALLIZATION IN MILD STEEL.—"Superfusion" is the term used to indicate a certain kind of crystalline fractures in mild steel. Crystals once formed tend to induce neighboring crystals to get the same way, on the principle that evil communications corrupt good manners. Whilst the metal is rigid, however, no action of this kind can take place. But if from any cause the metal in contact with the crystals is strained beyond the elastic limit and enters the plastic state, it is conceivable that the existing crystals may be able to succeed in changing some of their neighbors into the crystalline form. A second repetition of the plastic stage would then cause an extension of the crystallization, which would thus finally extend right across the most severely strained section. Molecules of metal lying either side of this section would not be liable to change, as they would not enter the plastic stage, and thus tests made on specimens taken along the line of fracture should show no loss of ductility. "Local hardening" of the material is the common sense term to describe fracture. But what causes local hardening? Engineers sometimes say the more rigid portions of the material takes more than its share of load beyond the elastic limits. Punching, also, sometimes starts cracks, but no one understands why they extend into soft parts of the plate.—Engineering Mechanics.

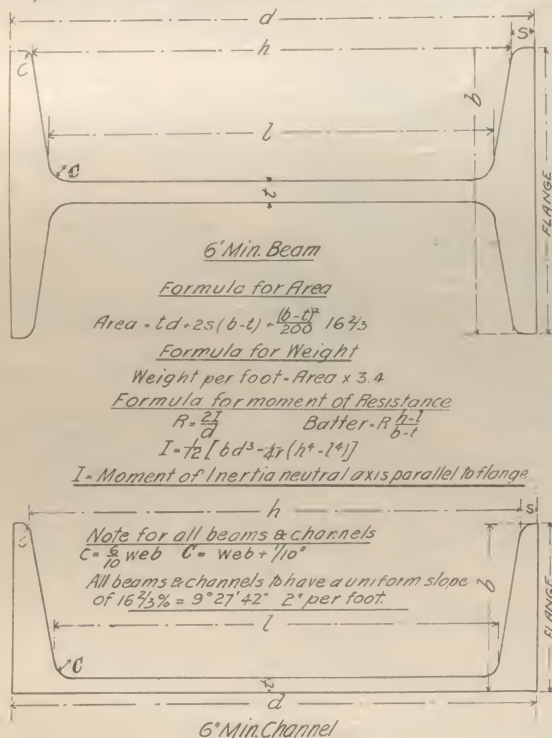
IMPROVEMENTS IN THE HUDSON RIVER.—It is stated that the deepening of the Hudson River to 12 ft., as far as the State Dam, seven miles above Albany, will probably be completed within the next two years. The improvement projected and being carried out by the federal government calls for a channel 12 ft. deep and 400 ft. wide to the foot of Broadway, in Troy, and a channel 300 ft. wide, but of the same depth, to the State Dam, at the head of navigation. The contracts for this work, let in 1893, cover the removal of 4,620,000 cubic yards of earth and 190,000 tons of rock, and the building of eight miles of dikes. The estimated cost is \$2,500,000.

TO REMOVE A GOOD CUT FROM TOOL STEEL.—There is little doubt that one of the most frequent causes of trouble with steel, arises from the fact that too many users of it fail to remove from the rough stock sufficient metal to get down to that part of the bar which is fit for use. It should be well understood by this time, says American Machinist, that the scale of a steel bar is nothing more than oxide of iron, and that for some little distance below this scale the steel has been decarbonized by the process of working, and cannot be expected to harden. When complaints are made of steel failing to harden, it is in most cases found to be the result of a failure to remove sufficient metal. It is probable that the average results obtained from manufactured taps, for instance, would be very much improved if it were the practice of the tap manufacturers to remove more steel from the bar, or, in other words, if they would buy a steel at least a sixteenth of an inch larger than the finished size of the tap, instead of a thirty-second of an inch larger, as is now too often, if not the universal practice of tap manufacturers. This failure to remove sufficient stock is also a frequent cause of what is called "uneven heating"—i. e., a tool maker will take a bar of steel, and either take the lightest possible cut from its surface on the shaper, or even grind it enough to true its surface, and then will sink an impression for a die. When he comes

to harden this steel, it may harden in spots where it happens not to be decarburized, and in others it will be entirely soft; and the tool maker will then find fault with the steel maker and claim that his steel does not harden evenly. It is a good practice to take never less than a thirty-second of an inch from the surface of tool steel and on large bars more than this is required.

STANDARD BEAMS AND CHANNELS.

A drawing has just been received from Messrs. Jones & Laughlins, Limited, Pittsburgh, showing the standard sections of I beams and channels which were adopted by the association of American Steel Manufacturers at their last meeting. These sections have been decided after a number of conferences, by the manufacturers, there having been for a long time a purpose among them to do away as far as possible with the disadvantages of the absence of standard sizes. The fact that designers have specified odd sections, is responsible for a large amount of the delay experienced in getting material and the adoption of these standards will assist greatly in this as well as in economy in manufacture of the shapes. The accompanying illustration, together



SIX INCH MINIMUM BEAM AND CHANNEL.

with the formulae thereon, has been reproduced from the drawing referred to. It shows a 6 in. minimum channel and a 6 in. minimum I beam, indicating the web, the flange and the slope as determined by the formula adopted by the manufacturers. For all beams and channels C equals the web plus $\frac{1}{10}$ in. c equals $\frac{1}{10}$ the web. All beams and channels are to have a uniform slope of $16\frac{2}{3}$ per cent. or 9 deg. 27 min. and 42 sec., or 2 in. to the foot. The tables below give

STANDARD BEAMS.

Depth, Inches.	Min. weight, Lbs.	Inter weights.	Max. weight, Lbs.	Min. fl. Inches.	Min. web. Inches.	Min. area, sq. in.
24	80.0	Vary by 5 lbs.	100.0	7.00	.50	23.3
20	64.0	65 lbs. then vary by 5 lbs	80.0	6.25	.50	19.3
15	42.0	45 " " " " " "	60.0	5.50	.41	12.5
12	31.5	Vary by 5 lbs.	40.0	6.00	.59	17.65
10	25.0	35 lbs. then vary by 5 lbs.	40.0	5.00	.35	9.3
8	21.0	Vary by 5 lbs.	35.0	5.25	.46	11.95
7	17.75	" " " " " "	40.0	4.66	.31	7.4
6	15.0	25 lbs. then vary by 5 lbs.	35.0	4.33	.29	6.3
5	12.25	Vary by 2 1/2 lbs.	25.25	4.00	.27	5.2
4	9.75	" " " " " "	20.0	3.66	.25	4.4
3	7.5	" " " " " "	17.25	3.33	.23	3.6
		" " " " " "	14.75	3.00	.21	2.9
		" " " " " "	10.5	2.66	.19	2.2
		" " " " " "	7.5	2.33	.17	1.6

STANDARD CHANNELS.

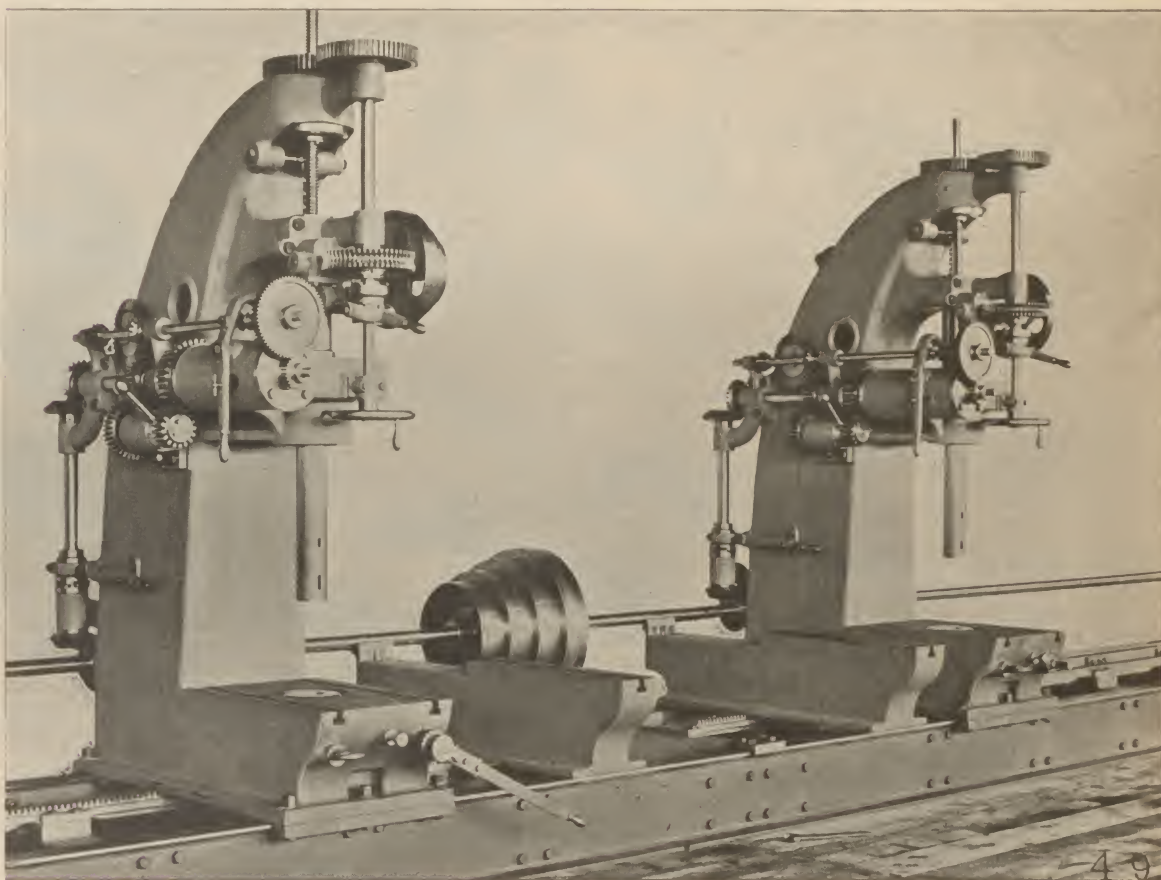
Depth, Inches.	Min. weight, Lbs.	Inter weights.	Max. weight, Lbs.	Min. fl. Inches.	Min. web. Inches.	Min. area, sq. in.
15	33.0	35 lbs. then vary by 5 lbs	55.0	3.40	.40	9.9
12	26.5	25 " " " " " "	40.0	2.94	.28	6.0
10	15.0	Vary by 5 lbs.	35.0	2.60	.24	4.5
9	13.25	15 lbs. then vary by 5 lbs	25.0	2.43	.23	3.9
8	11.25	Vary by 2 1/2 lbs.	21.25	2.26	.22	3.4
7	9.75	" " " " " "	19.75	2.09	.21	2.9
6	8.0	" " " " " "	15.5	1.92	.20	2.4
5	6.5	" " " " " "	11.5	1.75	.19	2.0
4	5.25	Vary by 1 lb.	7.25	1.58	.18	1.6
3	4.0	" " " " " "	6.00	1.41	.17	1.2

the standard sections with the intermediate weights. Messrs. Jones & Laughlins say that their weights will be governed by these tables and that the rolls will be changed to the new standard as fast as they are renewed. Some formulae which appeared on the drawing referred to have been reproduced with the sketches.

CHORD BORING MACHINE.

The extent to which the use of special machinery has been advanced in the building of bridges and similar metal structures, has been set forth in these columns from time to time by the illustration of machines for a variety of such work, but one of the most useful machines for this purpose is shown in the accompanying illustration of a chord boring machine. This machine is designed for boring bridge chords, I beams, and for other similar processes where rapid and accurate work is desired. This machine when once set to the proper distance between centers is perfectly capable of turning out a complete set of bridge chords which shall be exactly alike and by using two tools in each bar, of boring a 4 in. punched hole to 8 in. taking four cuts at one time.

There are two heads each complete in itself, and



CHORD BORING MACHINE—NILES TOOL WORKS.

driven independently. They are moved along the bed by a rack and pinion through a ratchet lever shown in the illustration and may be adjusted to any desired distance between centers up to the length of the bed. The heads have 18 in. reach and will therefore bore to the center of a circle 36 in. in diameter. The machine is built by the Niles Tool Works, Hamilton, O.

The Influence of Braked Trains on the Superstructure of Metallic Bridges.

BY F. JASINSKI.

[Revue Generale des Chemins de Fer, July, 1895.]

The author states that the necessity of taking into account, in calculations of the resistance and stability of large bridges, the forces produced by the passage of a train with the brakes on has already been pointed out, and the longitudinal force acting on the rails has been estimated, as well as the secondary forces produced in the main girders; but up to the present no attention has been given to the influence of braked trains on the superstructure of bridges, the ordinary construction of which gives a very insufficient resistance in this respect. Taking into consideration the fact that continuous brakes are being used to a great extent, and that on certain railways all the wheels of express trains are provided with brakes, this question has become of great importance.

The increased resistance which the rail offers to the movement of wheels when it is braked is not greater than the adhesion fQ , f representing the coefficient of friction, and Q the load on the wheels. The limit of this adhesion may be taken as $F = 0.25 Q$, in which F represents the tangential reaction of the rail against movement of the wheel. The rail is exposed to an equal and inverse force from the wheel, which tends to cause it to slide in the direction of the train, this force being transmitted to the bridge partly by the surfaces of contact, and partly by the fish-plates or other arrangements for preventing the sliding of the rails. It follows then, that in bridges of considerable spans, the tangential force of a braked train can be entirely transmitted by the superstructure of the bridge to the main girders, and from the latter to the supports. The author proceeds to discuss the question as to whether the construction of railway bridges satisfies this condition, in so far as the superstructure is concerned, leaving aside the question of the effect of braked trains on the general stability of bridges and the secondary tensions produced in the main girders.

In the ordinary superstructure, consisting of cross

girders and rail bearers, a kind of frame is formed, which is composed of three rows of rectangles in the case of single line bridges, or five rows with double line bridges. The rectangles under the lines of way are often strengthened by special bracing. With this construction the longitudinal forces are transmitted to the main girders by the rail bearers and cross girders. All the cross girders having the same dimensions are being fixed in the same manner to the main girders, it may be assumed that they receive the same longitudinal forces acting on the bay during the passage of a braked train.

The deformation of the rail bearers is neglected on account of its being very small. If p is the weight of a train per metre, d the distance between the cross girders, the author finds that the longitudinal horizontal force q acting on each cross girder at the connections with the rail bearers will be $q = \frac{1}{2} f p d$.

These forces produce corresponding reactions in the main girders, and tend to cause the cross girders to deflect in the horizontal plane independently of the vertical deflection caused by the weight of the train. Besides these horizontal and vertical flexures, the cross girders will be subjected to torsion, due to the fact that the forces q are not applied in the same horizontal plane as the reactions of the main girders.

Taking as an example a Russian railway bridge, the author calculates the stresses produced in the flanges of the cross girders by the passage of a train, all the wheels of which are braked.

The superstructure of this bridge is constructed independently of the main bracing. The principal dimensions are as follows:

Length of the cross girders	Feet
Distance between the cross girders	= 18
" " rail bearers	= 16
" " "	= 6

The weight p of an express passenger train being taken as 0.46 ton per lineal foot, the horizontal force acting on the cross girders at the points of connection with the rail bearers will be:

$$q = \frac{1}{2} \times 0.25 \times 0.46 \times 16 = 0.92 \text{ ton.}$$

Proceeding, the author finds by calculation that there is a maximum total strain of 6.73 tons per square inch in the extreme edges of the flanges of the cross girders.

Such a strain is very considerable, especially in taking account of the other secondary tensions to which the cross girders are subjected, together with the dynamic force of the shocks which are always present in the movement of a braked train. The author states that this example sufficiently denotes the serious influence of the passage of braked trains on the superstructure of bridges, and points to the necessity of strengthening them, before exposing them to the passage of trains having all the wheels braked.

A sketch is given of a single line bridge, showing what the author considers is one of the surest, and at the same time the simplest and least costly method of bracing in which to obtain the strengthening required. It consists in having a tie beam—an angle bar $3 \times 3 \times \frac{5}{8}$ in.—from each connection of the cross girder with the main girder to the center of the adjacent rail bearer, the two rail bearers having an independent bracing between them; the dimensions of the angle bars mentioned are, in the author's opinion, quite sufficient to resist the longitudinal forces produced.

In the case where the cross girders are fixed to the gussets of the main girders between the flanges, the difficulty of strengthening the superstructure to

resist these forces is very much increased. The author suggests that in the case of main girders of considerable depth, the gussets to which the cross girders are attached could be strengthened by means of struts, one of the ends of which would be riveted to the gusset, at the height of the neutral axis of the cross girder, and the other to the foot of the next gusset; and also for the same purpose, connect all the gussets together by a horizontal bar of a length equal to the length of the main girder, and fixed at the height of the neutral axes of the cross girders.—[Inst. C. E. Foreign Abstracts.]

TRACK ELEVATION N. Y., N. H. & H. R. R. IN BOSTON.

In our issue of last week a brief description was given of the general plan which is being pursued in the elevation of the tracks of the Providence division of the N. Y., N. H. & H. R. R. in Boston with illustration of some of the details of the arch bridge at

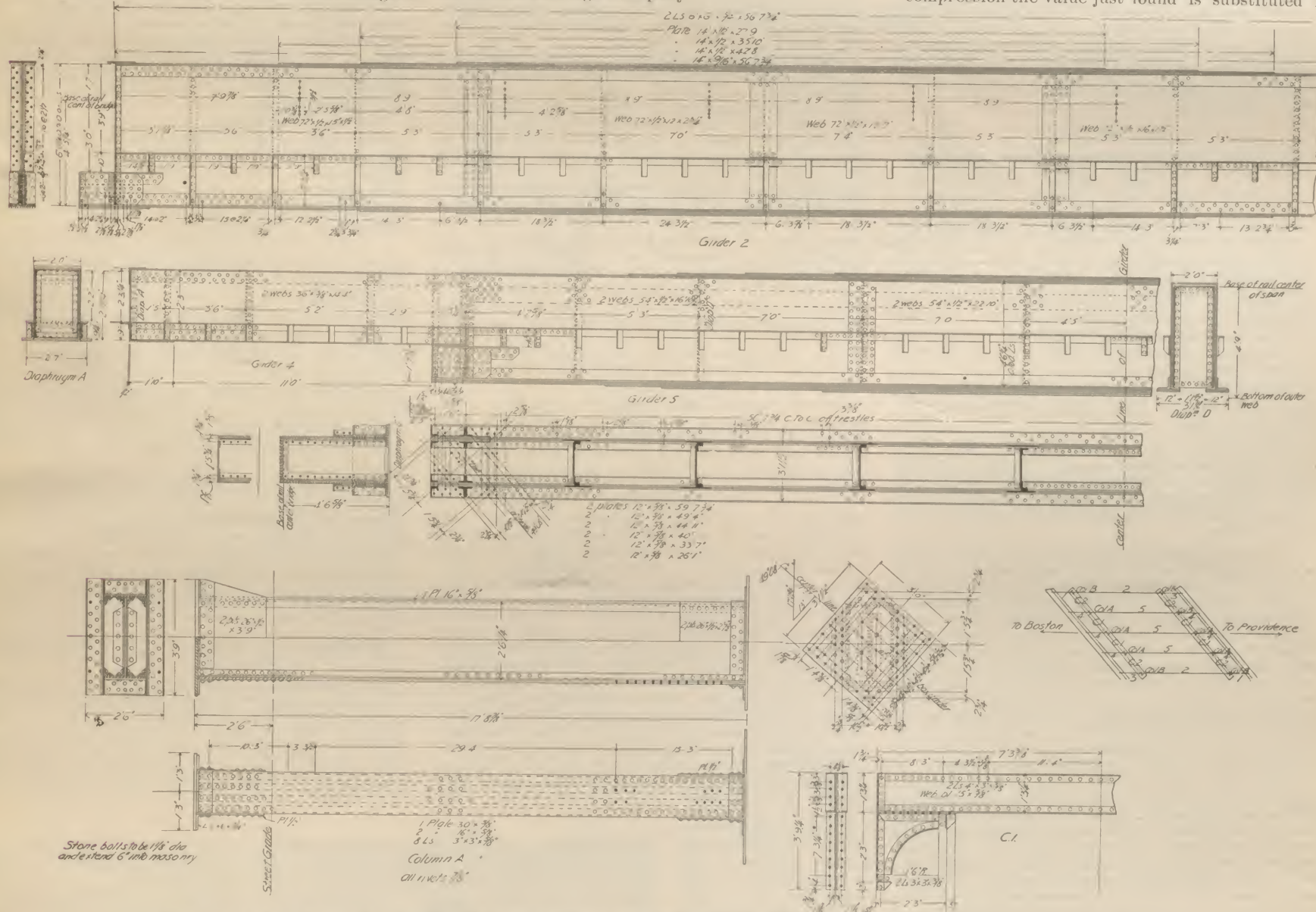
makes it necessary to use two different columns, one of which, column A, which is the heavier construction, being shown in the illustration. This is built up of 3x3x½ angles and ½ plates with gusset plates at the base and riveted stiffening plates at the top. These columns are set parallel to the street line and the bearing plates at the top are set at the angle of the girders as shown in the plan view. The construction of the strut is shown in the drawing and need not be enlarged upon here. The strut shown is used between the heavy columns under the box girders. The lighter columns for the outside girders are of the same general design as the heavier ones, which also applies to the struts. The base of rail at the center of the bridge is even with the top of the main box girders and the side girders are enough higher to project about 1 ft. 7 in. above the top of the rail. It is expected that gravel ballast will be used in this construction although it is not known that this is definitely decided upon. The contract for these two bridges have been let to the Berlin Iron Bridge Company.

Spans above 50 ft., 30 per cent minus 1½ per cent for every additional 10 feet of span up to 250 ft., where the allowance for impact ceases. All counter ties, middle panel ties, and long suspenders, 30 per cent. The following unit stresses are specified:

	Lbs. per sq. in.
Tension in bars and rods	10,000
Tension in shapes and plates	9,000
Compression, length less than 8 times diameter	8,000
Bending stress, pins and rivets	12,000
Pins and rivets, bearing stress	12,000
Shearing stress	6,000
Shearing stress, web plates not to exceed	7,500

No portion of the web is considered as transmitting flange stress nor any portion of the flanges as transmitting shear. The fiber stress in I beams and channels subject to bending stress is not to exceed 8,000 lbs. per sq. in. Members subject to alternate stresses are designed for an unit stress and tension of 9,000

$(1 - \frac{s}{S})$ where s and S are the smallest and largest of the maximum stresses of sign. For unit stress in compression the value just found is substituted for



TRACK ELEVATION, NEW YORK, NEW HAVEN & HARTFORD RAILROAD—GIRDERS FOR WASHINGTON STREET BRIDGE.

Walk Hill street and herewith we present illustrations from the drawings of the bridge at Washington street which is also a part of the elevation work. The Washington bridge consists of a four track skew bridge with a main span of 56 ft. 7½ in. and two side walk spans 14 ft. 4 in. each. There are five girders at 13 ft. centers the ones on the outside being plate girders and the others box girders. Both of these forms are shown in the accompanying illustrations together with the posts which are placed in the side walk lines and a portion of one of the struts which are used for lateral bracing of the columns. The floor is similar to that for the Walk Hill street bridge and the illustration of this feature is omitted here.

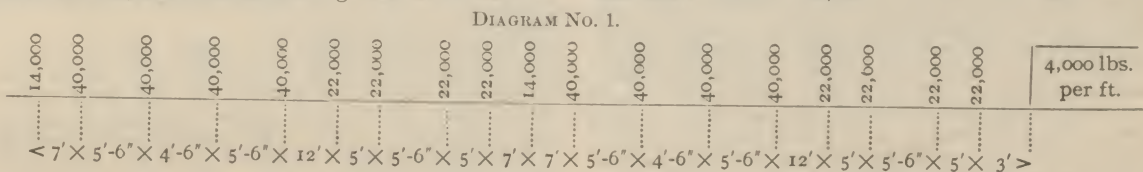
By referring to the small diagram in the drawing, the arrangement of the girders will be easily understood. The three main girders marked 5 in the diagram are of the box type and are 4 ft. 6½ in. deep. These girders are 56 ft. 7½ in. center to center and they project beyond this 18 in. at each end of the seats of the posts. The webs of these girders are ½ in. thick and they are stiffened by diaphragms, the locations of which are shown in the drawing. Upon the ends of the main box girders, seats 18 in. in length are provided to receive the ends of girders marked No. 4 which are also of the box pattern, 2 ft. 7 in. wide at the bottom by 2 ft. at the top. The short box girders also have diaphragms and are, like the main girders, heavily constructed. Girders numbered 2 are located on the outside of the bridge at each side and are of the plain plate type 6 ft. high. The total length of the main girders is the same as of the main box girders and the side walk space at each side is spanned by a short plate girder at each end. No. 1 and 3 are constructed differently on account of the skew of the abutments. The difference in the weight of the girders and their construction

According to the general specifications issued in 1894 by Mr. F. S. Curtis, chief engineer N. Y. N. H. & H. R. R., all members of bridges are proportioned to carry the following loads: 1, 600 lbs. per lineal foot per track as the weight of roadway above track stringers; 2, the effect of bending of its own weight in each individual member; 3, the resultant stress from the entire weight of the structure. The rolling load for each track shall consist of a uniform load of 4,000 lbs. per lineal foot preceded by two engines as specified in the following diagram. An allowance is made for impact from the rolling load as follows:

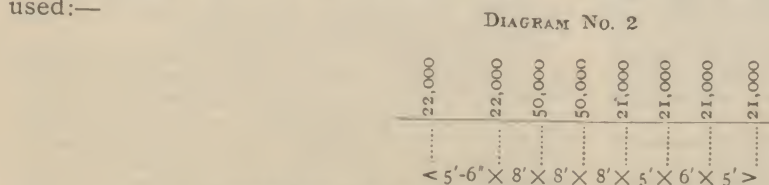
the numerator (8,000) in the formulæ for posts. All riveted work is punched with holes ⅛ in. larger than the size of the rivet, and the punching die is not to exceed the diameter of the rivet by more than ⅛ in.

For wrought iron, tests on standard specimens are not to show less than the following minimum requirements:

	Ultimate Tensile Strength.	Elong. in 8 in.		Reduct'n Per ct.
		Per ct.	Per ct.	
Plates over 24 in. wide.	48,000 lbs. per sq. in.	12	12	
" 24 in. wide or less	48,000 "	15	18	
Angles and shapes	48,000 "	15	18	
Bar iron	50,000 "	20	30	



For spans where it will give greater stresses than the above, diagram No. 2 shall be used:—



DIAGRAMS FOR STRESSES IN BRIDGES.—N. Y., N. H. & H. R. R.

	Per ct.
Riveted connections of floor beams, track stringers and short suspenders	100
Stringers and floor beams	60
Span 15 ft. in length	60
Span 20 "	55
Span 30 "	45
Span 40 "	37
Span 50 "	30

The elastic limit is required to be not less than 27,000 lbs. per sq. in.

All steel is required to be of the open hearth process and is not contain more than 0.06 per cent of phosphorus, 0.085 per cent. of sulphur, nor 0.45 per cent of maganese. Steel must have an ultimate tensile strength between 56,000 and 64,000 lbs. per sq.

in., with an elastic limit of not less than 55 per cent of the ultimate strength. The elongation must be 25 per cent in 8 in. as a minimum, and the minimum reduction of area is 50 per cent. Rivet steel when tested in specimens of the full size of the rivet rod shall have an ultimate tensile strength of not less than 50,000 lbs. nor more than 54,000 lbs. per sq. in., with a minimum elongation of 30 per cent in 8 in. and 60 per cent reduction of area. The following punching tests are specified, material $\frac{1}{4}$ in. thick and less shall stand punching in the ordinary manner with $\frac{1}{8}$ in. holes spaced $1\frac{1}{2}$ in. from the edge of the plate, or the same distance center to center of holes without cracking or breaking down of walls between the holes. Punched holes pitched $1\frac{1}{2}$ diameters from a sheared edge shall stand drifting to $1\frac{1}{2}$ times their original diameter without cracking.

The following are the requirements for cast steel: Steel castings shall be made of open hearth steel containing not over 0.07 per cent of phosphorus, and the test pieces shall show an ultimate tensile strength of 65,000 to 70,000 lbs. per sq. in., with an elastic limit of not less than 35,000 lbs. in., an elongation of 15 per cent in 2 in., and a reduction of area of 25 per cent. The castings shall be fine grained, homogeneous and free from blow holes, and shall be true to the required dimensions after being thoroughly annealed.

EFFECT OF REPEATED SHOCKS UPON CAST IRON.

One of the most commonly accepted theories concerning cast iron is that repeated shocks have a tendency to make it brittle, and that if long subjected to such treatment will become materially weakened. It will therefore probably surprise many to learn that this theory seems to be entirely mistaken. The subject was discussed by Mr. Alexander E. Outerbridge, Jr., chemist to Wm. Sellers & Co., Incorporated, in a paper read recently before the American Institute of Mining Engineers entitled, "The Mobility of Molecules of Cast Iron," from which the following paragraphs are taken:

The result of about a thousand tests of bars of cast iron of all grades, from the softest foundry mixtures to the strongest car wheel metal, enables me to state with confidence that, within limits, cast iron is materially strengthened by subjection to shocks of repeated blows.

It is very well known that the usual process of annealing castings—such, for example, as car wheels—increases their strength by releasing cooling strains. It is not well known, if known at all, prior to this announcement, that the molecules of cast iron are capable of movement—for they do not touch each other—without the necessity of heating the casting, and they can thus rearrange themselves in comfortable relation to their neighbors and relieve the overcrowding near the surface of the casting, or, in more technical words, a molecular annealing may be accomplished at ordinary temperatures which will release the strains in the castings precisely as does annealing by slow cooling in heated pits or ovens.

I noticed in the year 1885 (being at that time engaged in metallurgical work at a large car wheel establishment) that chilled cast iron car wheels rarely cracked in ordinary service after having been used for any considerable time; if wheels did not crack when comparatively new, they usually lasted until worn out or condemned for other causes. No application was made of this observation at that time, further than to institute a careful investigation of the condition of the annealing ovens when some new wheels were returned cracked, under the supposition that the wheels were not well annealed, and an equally careful revision of the iron mixture to ascertain whether the fault lay therein.

In 1894 a large number of "transverse test bars" (1 in. square, 15 in. long) accumulated in the foundry of Wm. Sellers & Co., Incor., and to expedite the cleaning of sand from their surfaces they were all thrown into an ordinary "tumbling barrel" with other castings, and knocked about for several hours. When these test bars were broken upon the transverse testing machine and the records tabulated I noticed with surprise that the average strength of the entire series was considerably higher than was usual with similar iron mixtures. This difference was fortunately sufficiently marked to cause a careful inquiry, first into the condition of the testing machine, then as to the chemical composition of the metal in the bars. The machine was found in good order; the metal was normal. A core pattern was then made, upon which 12 test bars could be molded side by side in one flask and poured from one runner. Six of these bars were placed in the tumbling barrel and the other six were cleaned of adhering sand with an ordinary wire brush; the 12 bars were broken upon the machine. All of the bars which has been subjected for about four hours to incessant blows in the tumbling barrel were stronger than the companion bars; the actual gain varying from 10 to 15 per cent; this metal was soft foundry iron.

These tests were repeated on several consecutive days, with similar results. One plausible explanation offered was that the rubbing of the bars together in the machine slightly rounded the corners, and thus prevented a starting point for a "check" or break of the bar, under the strain in the testing machine. This theory was soon overthrown by tests. The corners of six bars were rounded by filing; the companion bars were not filed. All of the bars were cleaned with a wire brush and broken upon the transverse testing machine. There was no apparent gain in strength in the bars with rounded edges.

Round test bars (1 1/8 in. diameter, 15 in. long) were then poured from one ladle of iron; some of these were cleaned in the tumbling-barrel and all that were so treated proved to be much stronger than the companion bars which were merely cleaned with a wire brush.

This process of eliminating false theories was continued until finally a new explanation occurred to me, and simultaneously a convincing test of its accuracy suggested itself. The explanation is indicated in the title of this paper, "The Mobility of Molecules of Cast Iron," at ordinary temperature, when subjected to repeated shocks. The crucial test referred to was in subjecting six bars to 3,000 taps each with a hand hammer upon one end only of each bar. All of the bars so treated showed a gain in strength equivalent to the gain exhibited by bars which had been subjected to blows over the entire surface for several hours in the tumbling barrel. Here was a new revelation of scientific interest to the metallurgist, and suggesting to the founder the possibility of annealing castings at ordinary temperatures, by availing himself of this molecular mobility. It also proves that he has for many years been unconsciously accomplishing this beneficial result—at least partially and irregularly—by tumbling small castings in a revolving barrel, merely for the purpose of conveniently cleaning them from adhering sand.

The foregoing experiments have been repeated sufficiently often to satisfy me of their absolute reliability (and really remarkable uniformity), a new series of tests was commenced for the purpose of ascertaining how many blows were required, and approximately what force was needed to accomplish the desired object of relieving cooling strains. A new machine was constructed for this purpose. The impact machine at first used was an old one, and consisted of a weight fastened to an arm swinging in a graduated arc. The friction of the pivot and the crude construction of the machine precluded certain or even approximately sure results as to the force of the blow delivered. The new machine consisted of a frame or yoke, marked in inches, and a wedge shaped weight adapted to the size of the bars to be tested, which was raised perpendicularly to any desired number of inches, and, when released, fell by gravity in free space, striking the bars in the center between the supports, which were 12 in. apart. A 14 lb. weight was adopted for testing 1 in. bars.

Impact testing machines have long been used, and car wheels are accepted or condemned upon tests made upon such machines. It has always been maintained that each blow of the "drop" weakened the casting, and the final blow was only a record of the residual cohesion, remaining in the metal after previous blows had proportionately weakened it. In the case of a thoroughly annealed car wheel, this reasoning may be sufficiently correct; but as applied to impact testing machines used for testing unannealed bars, the argument is absolutely fallacious. The impact testing machine is itself a means of molecularly annealing test bars.

Six of the 1 in. square test bars cleaned with the wire brush were broken upon the impact machine by dropping the weight from a sufficient height to break each bar at the first blow. The six companion bars also cleaned with a brush, were then in turn subjected to blows numbering from 10 to 50 each, of the same drop weight, falling one-half of the former distance; three blows being insufficient to break the bars. The weight was then permitted to fall upon each of these bars in turn from the height at which the six bars previously tested were broken on first blow. Not one bar broke. Two, three, six, ten, and in one case 15 blows of the same drop from the same extreme height were required to break these bars. In another similar case, the weight was dropped once from the former height, then raised by inches until four more blows, each being one inch higher than the last, were delivered before breaking the piece. Subsequent tests gave still greater gain in strength.

The next experiment with the impact machine was designed to test molecularly annealed bars from the tumbling barrel in comparison with untreated companion bars, under one heavy blow. It was found that a blow of sufficient force to break the unannealed bars with one fall of the weight must be repeated from 5 to 20 times (depending mainly upon the nature of the iron mixture) to break the molecularly annealed companion bars. By careful experiment in the manner previously noted, the ultimate strength of the bars which had not been through the tumbling barrel could be increased by successive slight blows upon the impact machine, to an equality with their companions.

The experiments form a part of the daily records of metallurgical work at the foundry of William Sellers & Co., Incorporated, Philadelphia, and the aggregate number tabulated is very large indeed. All of the tests corroborate to the fullest degree the statements made; and they are susceptible of repetition and confirmation by any one interested in work of this character. They form a part of a long series of investigations (extending over a period of 15 years) upon the relation between the physical nature and chemical composition of cast irons. They have served to throw some light upon hitherto obscure phenomena in the design, construction, etc., of castings, and, it is believed that they contain the germ of a new scientific discovery, valuable in its principle to all workers in these fields.

In conclusion, it should perhaps be stated, to avoid the possibility of misunderstanding, that the molecular annealing of cold cast iron by successive slight shocks differs from annealing by heat, in that it has no power to change the condition of carbon in the casting, or to alter the chemical constitution in any way. All that is claimed is, that every iron casting, when first made, is under a condition of strain due to difference in the rate of cooling of the metal near the surface and that nearer the center, and also to difference of section; further, that it is possible, and practicable, to relieve these strains by tapping repeatedly the casting, thus permitting the individual metallic particles to rearrange themselves, and assume a new condition of molecular equilibrium.

A few practical deductions of universal application may be drawn from these observations.

1. Castings, such as hammer frames, housings for rolls, cast iron mortars or guns, which are to be subjected to severe blows or strains in actual use, should never be suddenly tested to anything approaching the severity of intended service. Quantitative tests made upon the impact machine prove that the molecules of cast iron rearrange themselves under reasonably few shocks, so that it is perfectly practicable to molecularly anneal such castings when cold. Pulleys, and indeed all castings, are subjected in every day service to this process of molecular annealing; and old castings are therefore more reliable than new ones, unless misused. It is not impossible that the same law applies to steel castings, and perhaps to all metal castings.

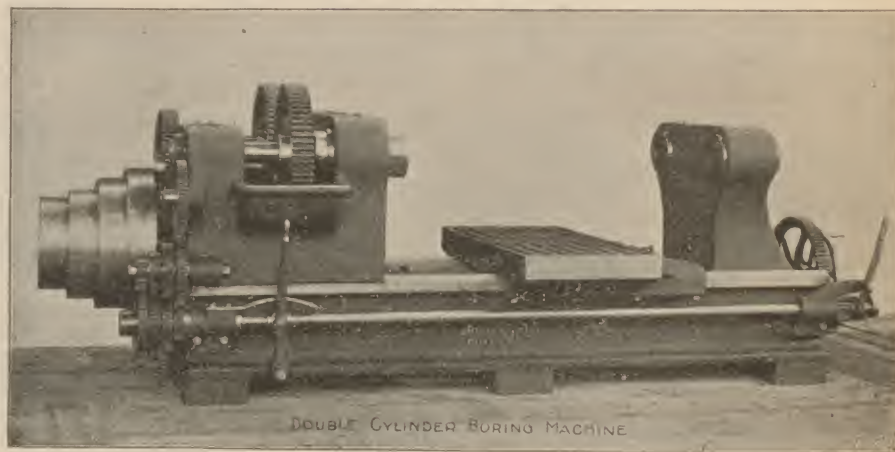
2. Strong iron castings, and castings of irregular section, have greater initial strains than soft iron castings or castings of comparatively uniform section; and it is, therefore, more important to subject such castings to gradually increasing shocks, until the strains are relieved by the movement and rearrangement of the molecules.

A number of tables are given in the paper showing the results of transverse tests on specimens which had undergone this molecular annealing in comparison with bars cast in the same molds, which had not been treated, the statements being based upon the records of about a thousand experiments. One inch bars showed a maximum gain of nearly 19 per cent tested transversely. The author stated that there was evidence of a variation depending upon the mixture of the iron and the number of blows given up to a point at which the strain is relieved beyond which an increased number of blows does not increase the strength of the bar.

To corroborate his results, Mr. Outerbridge had tests made upon 2 in. bars on the testing machine of Messrs. A. Whitney & Sons by an attendant who did not know the object of the work. His results checked with those of the author and afterward similar treatment of car wheel iron by that firm also agreed with what had been done before.

DOUBLE CYLINDER BORING MACHINE.

The illustration herewith shows the appearance of a double cylinder boring machine recently put on the market by Bement, Miles & Company of Philadelphia. The machine is designed for boring all kinds of cylinders but is particularly useful and economical in shops where small cylinders are turned out in duplicate and in large numbers. In



work of this character a large output can be obtained as two cylinders can be bored at the same time and as the machine is very strong, heavy feeds can be carried. The machine can be built to dimensions suitable for a variety of work but as usually constructed has a bed plate $11\frac{1}{2}$ ft. long, two spindles from 5 to 9 in. in diameter and 31 in. between centers, a work table 66×42 in. with a traverse of 45 in., four automatic feeds from $\frac{1}{32}$ to $\frac{1}{4}$ of an inch, and a swing of 48 in. over the bed and 38 in. over the table. The driving cone is 30 in. in diameter and has four steps for a 5 in. belt the gearing being 15 to 1. The spindles at the driven end are carried by a heavy head-stock and the outer ends are supported by a double tail-stock fitted with removable bushings.

The spindles have a traverse of 24 in. Work 36 in. high may be taken in under the cutter. The spindles are steel forgings. The range of speed is such that holes down to $1\frac{1}{2}$ in. in diameter may be bored with economy. One of these machines has recently been installed for use in the manufacture of air compressors, rock drills, etc. and is proving very efficient and satisfactory.

THE SCHOEN PRESSED STEEL TRUCK ON M., K. & T. RY.

The Schoen pressed steel truck and body bolsters were illustrated in the RAILWAY REVIEW of March 21 of the current volume in connection with standard truck No. 7 of the M., K. & T. Ry. The general appearance of the bolsters is indicated in the illustration of the truck in the article referred to, but the drawing of this truck, which has been received through the courtesy of Mr. William O'Herin superintendent of motive power of that road, is such a particularly good one as to lead to our reproducing it herewith. It gives a better idea of the construction and dimensions of these bolsters and their attachments than we have seen elsewhere. This style of bolster and spring plank was furnished by the Schoen Pressed Steel Company for 2,000 cars of 60,000 lbs. capacity, built under specifications by Mr. O'Herin for the M., K. & T. Railway last year. The design is so well understood that special comment thereon is not necessary, especially in view of the clearness of the illustration. The brake beam, balance and hanger brackets, as well as the safety bracket and bottom rod chafing plates, are shown in detail at the lower right hand corner of the illustration. It will be noted that the spring plank has a deep rib pressed through it at the center to add to the stiffness of the construction, and two $\frac{3}{4}$ in. holes are provided at the bottom of the depression as an outlet to water which would otherwise collect therein. King's side bearings are used. The illustration plainly brings out the location of the stiffeners at the center of the bolster, and the arrangement whereby they are made to hold the kingbolt in place without the necessity of using additional parts for this purpose.

It may not be out of place here to refer in a general way to the desirability of using pressed steel in the construction of trucks. As an acknowledgement of the rapid advances which have been made in the design of car trucks, the committee upon large cars, reporting recently to the New York Railroad Club, made the following statement which applies to a large extent to the cars of 60,000 lb. capacity, as well as to the large cars under consideration by the committee: "The trucks to be used under these large cars is a matter of great importance, and is receiving constant attention; in fact, truck construction has outstripped the body construction so far as strength is concerned, to such an extent that it requires but a passing notice at the hands of your committee. The steel bolsters and transoms used seem to be fully up to the requirements of the traffic," etc.

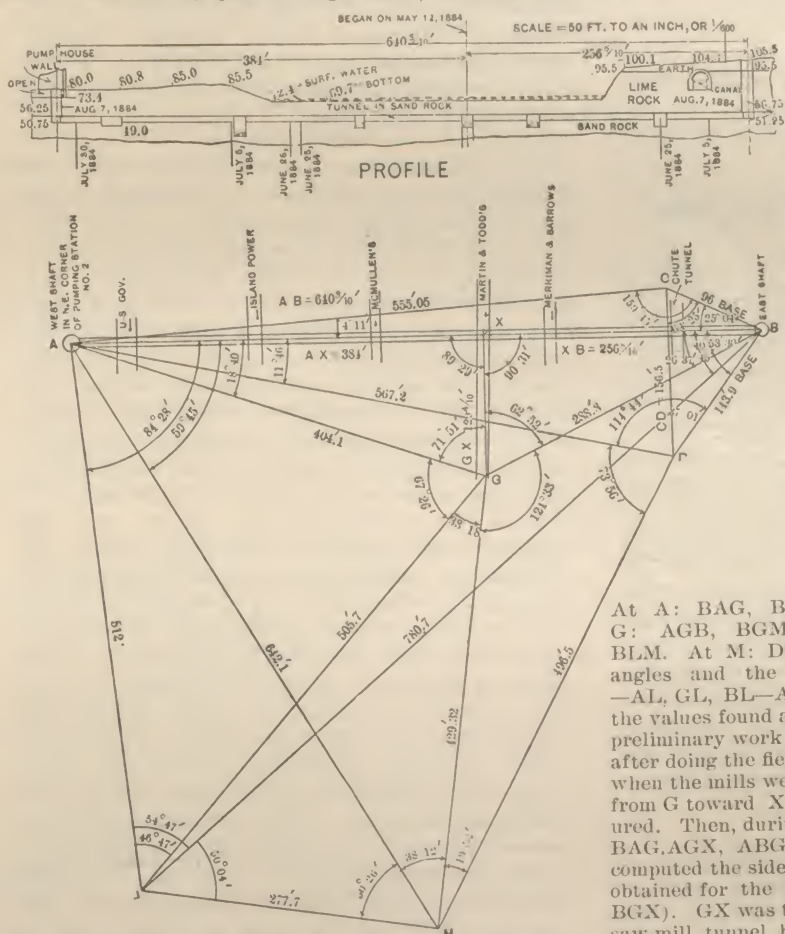
One of the greatest objections to the present wooden and iron trucks is the great number of parts which are ordinarily used in their construction. This in an extreme case runs as high as 466 parts in a swing motion truck, and 323 parts in the rigid truck. But with particular reference to the bolsters, several years ago the expression was made before the Master Car Builders' Association that of all the parts of cars the constructive weakness of the bolsters was the greatest. Steel construction has a great advantage in the great saving of weight, and those who are entering into the use of all metal

every indication to believe that the extension of the use of this material is but just commenced.

TRIANGULATION PREPARATORY TO ALIGNMENT OF A TUNNEL.*

WM. W. REDFIELD.

In the spring of 1884, the Water Board of Minneapolis, Minn., decided to sink a shaft in the northeast corner of pumping station No. 2, commonly known as "The East Side Pumping Station," and situated on Hennepin Island in the Mississippi river; also to sink another shaft on the eastern shore of the Mississippi, on Third Avenue Southeast, about twenty feet east of the east line of Main street; and also to connect said shafts at bottom, by a tunnel; all for the purpose of conveying two 30 in. water pipes across the east channel of the Mississippi river. As every one familiar with the geology of Minneapolis well knows, the shafts successively pass through earth, limestone and



TRIANGULATION PREPARATORY TO TUNNELING. sandrock of a yellowish-white color, the latter easily worked with the pick, and very favorable for tunnel driving. The lower surface of the limestone ledge being nearly level, forms an excellent roof for a tunnel. In fact, the numerous tunnels for the tail races of the various mills are nearly all driven immediately under this ledge. It was decided to make the shafts circular in shape and 10 ft. in diameter; and the connecting tunnel, rectangular

right angles, their general elevation of water surface being fortunately below the level of the bottom of the tunnel proposed. Three of these tunnels carried tail water from saw mills; another one was an abandoned tail race, as was also the old government tunnel; and a sixth one was the tail race of the Island Power Company, quite deep, having recently been lowered. Of these, the Martin & Todd saw mill tail race crossed nearest the center of proposed tunnel, and as it was desirable to let shafts and tunnel separately by contract, and in order to save time, it was decided to commence driving the tunnel a little before the shafts were begun. Accordingly the Martin and Todd tunnel was selected as a means of access, and the tunnel proposed was to be driven simultaneously east and west from the saw mill tunnel towards each shaft; these shafts did not reach the bottom of the rock for some days after the tunnel contractors reached and removed the sand rock below limestone at the bottom of each shaft. The task of providing alignment for the above, falling upon the author, he devised the system of triangulation as explained below, reference being had by letter or otherwise to the accompanying diagram and profile.

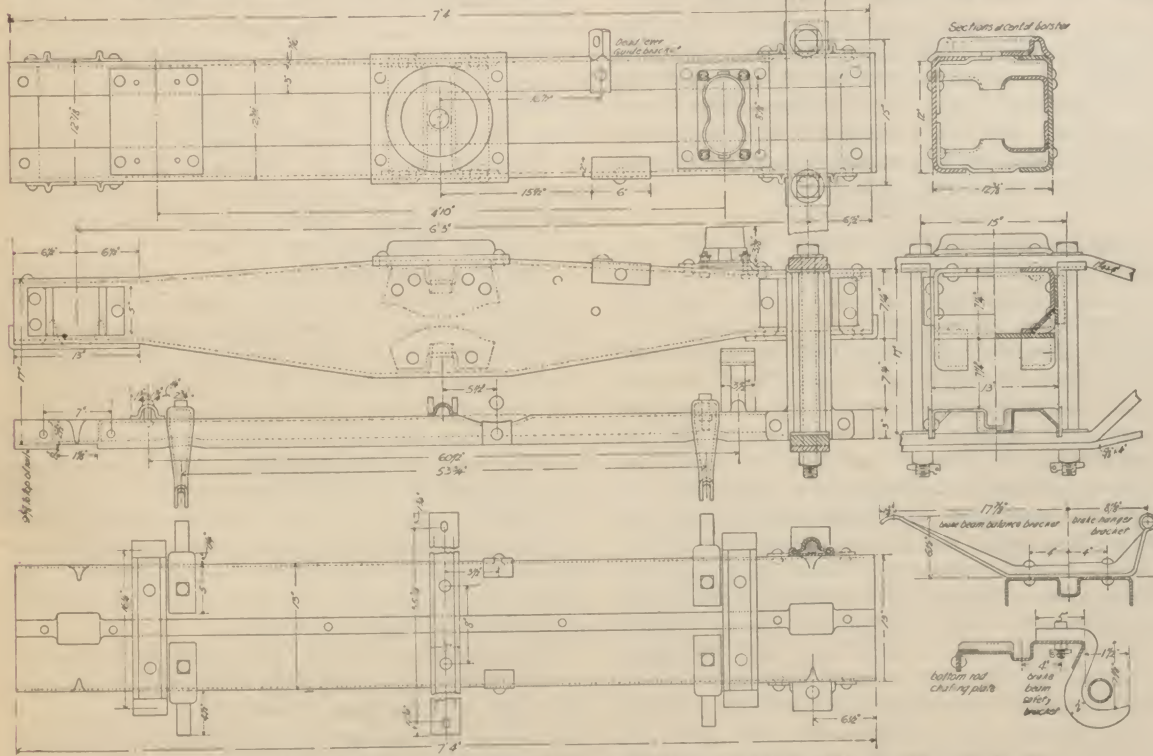
Points A and B, or centers of shafts, being located, two points, C and D, were established, and base lines BC and BD were carefully measured; these being very short (96 and 143.9 ft. respectively), two were chosen, as a check on each other; and it being at that time difficult to find any longer ones. Angles were observed as follows: CBA, ABD, CAB, BAD, ADB, CDB, ACB, DCB. From these elements AB was computed by two solutions from triangles ACB and ADB; CD, AC and AD were also calculated. This established the length of proposed tunnel to be 640.8 ft.

Next, to facilitate the entrance of a line up the Martin and Todd tunnel, a point G was placed at mouth of said tunnel in such position as to see therefrom up the tunnel. Auxiliary points were also placed at L on Hennepin Island, and at Mon the east bank, both some four hundred feet down stream.

The following angles were then taken:

At A: BAG, BAM, BAL. At B: ABG, ABL. At G: AGB, BGM, MGL, LGA. At L: ALG, ALB, BLG. At M: DMG, GMA, AML. From these various angles and the proper triangles the sides AG, BG, AL, GL, BL, AM, GM, DM, LM were computed and the values found as indicated on diagram. This necessary preliminary work was prepared in the office beforehand, after doing the field work. Then on Sunday, May 4, 1884, when the mills were shut down, an indefinite line was run from G toward X and the angles AGX and BGX measured. Then, during the week following, from the angles BAG, AGX, ABG, BGX, and the sides AG and BG were computed the sides AX, BX, and GX (two solutions being obtained for the latter from the two triangles AGX and BGX). GX was the distance required to proceed up the saw mill tunnel before beginning the work; the angles AXG and BXG (together necessary to be 180 deg.) gave the proper angularity to turn at X from line GX, after measuring GX. XA gave total distance to proceed westward and XB total distance to proceed eastward to reach each shaft. The second set of calculations having been finished, on Sunday, May 11, 1884, the transit was again placed at G, and the angle AGX turned off, sighting towards X; the calculated distance GX, or 129.4 feet was measured carefully on said line to point X, which point was thus established. Then the transit was placed at X and the angles AXG and BXG successively turned off, thus enabling a point on a line of proposed work to be placed both east and west. Next morning, Monday, May 12, 1884, work was commenced and diligently prosecuted to completion. The shafts were begun somewhat later, and finished to bottom of rock; the east one on or about August 7, 1884; the west one somewhat later, and the tunnel reaching both ends, as stated before, some days before August 7, 1884. The tunnel and shafts carry at present one boiler iron pipe 30 in. in diameter in tunnel and a cast iron pipe 30 in. diameter in shafts, and placed on the south side of tunnel and shafts, leaving room for an additional one on the north side, whenever required. The accompanying diagram and profile give a few statements showing rate of progress and datum heights. At present date the pipe and tunnel and shafts have not ceased to give satisfaction. It might be of interest to state here that the pipe in tunnel rests on rollers at a suitable distance apart, bearing on iron plates, and near the middle of tunnel the pipe is provided with a sliding joint, like a stuffing box, to take up any longitudinal expansion or contraction. The pipe at top of each shaft reduces to a 24 in. cast iron pipe. The water comes from a computed 10,000,000 gallon pump, but ordinary daily work runs from 4,000,000 to 7,000,000 gallons.

SOUTHERN AND WESTERN GRAIN TRADE CONGRESS.—On April 29 the Southern and Western Grain Trade Congress will meet in Charleston. Arrangements are being made for a large gathering, and it is quite probable that this will be the most noted session of this congress. The Charleston people are to be congratulated upon having succeeded in inducing President Stayvesant Fish, of the Illinois Central Railroad, to promise an address on "The Ways and Means to Facilitate Business Between the West and the South." President Fish has been one of the great factors in bringing about closer business relations between the west and the south, and to the work of the Illinois Central Railroad is due very much of the tide of population which is moving to Mississippi and adjoining states and to the great movement of grain through New Orleans. It is, therefore, especially appropriate that President Fish should have been called upon to discuss a matter of such importance as this.



THE SCHOEN TRUCK BOLSTER AND SPRING PLANK.—M. K. & T. R. R.

trucks are able to save about 1,500 lbs. in weight per car. The elimination of this amount of weight in addition to the saving which can be made by such methods as the substitution of steel for wood in center sill construction whereby, for instance, nearly 1,500 lbs. more can be saved, is an improvement well worthy of following up, because within reasonable limits the saving of weight of the car without sacrifice of carrying capacity, means an increase of efficiency from the reduction of the amount of dead weight of the car. If, however, greater strength may be obtained by means of steel construction there is all the more reason for its adoption, and there is

in cross section and 8 ft. 6 in. wide in clear, lined on both sides with a rubble wall 16 in. in thickness, and 5 ft. 4 in. clear height, and floored with concrete 2 in. thick. The natural way in this work would have been to sink the two shafts to the depth desired, and with two points at one shaft in line with two similar points at the other shaft, to transfer each pair of points to bottom of their respective shafts by careful plumb lines, from which the tunnel alignment would be made. This would have been the only way possible at this tunnel if it had not been for the fact that six other tunnels were to be crossed at nearly

*A paper read before the Engineers' Club of Minneapolis, Minn., published in the Journal of the Association of Engineering Societies.

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CHICAGO, SATURDAY, APRIL 11, 1896.

THE iron trade is not exactly in a flurry, but inharmonious influences are at work. Steel rails were advanced to \$28, because pig advanced \$7.00 per ton, but since it has fallen along with billets several dollars per ton, no decline in rail prices has been announced. Even now, after lake ore quotations have been fixed and other elements of cost determined the wide difference between cost of rail production and prices remains. Only railway managers can answer as to what degree this has restricted demand. A wise course would seem to point to the naming of reasonable prices. Billets are now \$20 at Pittsburgh, and between this and \$28 is a gulf few railroad managers will jump. Besides there is not now a sufficiently vigorous demand to warrant excessive quotations in ore, coke or any other raw material. It appears that the leaders in the steel and ore industries were discounting an unusually prosperous season, but the best laid anticipations of mice and men, as Robert Burns said, often take their own way.

THERE is now a tendency in many directions to speed up the machines in railway repair shops in order to increase the output of the works, and some phenomenal records have been made in this direction. Many master mechanics are doing this in a perfectly straight forward way by putting larger pulleys on the countershaft or increasing speed between the countershaft and the tools. Others are making a great improvement by speeding up the quick return of all reciprocating machines. Some are combining these schemes until the shops have gained a semblance of life to which formerly they were strangers. It is related of a master mechanic who did not wish or dare to be frank with his men, that a plan was recently arranged for the speeding up of the main shafts of his shops with the object of obtaining more rapid work in the hope that the men would not notice the change, but would work right along in ignorance of the increased output. This sounds like and probably is a fairy tale, but it serves to illustrate a method of shop regulation for which foundation in fact exists to a greater or less extent in some shops. Is it not far better for shop officers, and in fact all employers of men, to use plain dealing in all matters pertaining to increasing the output of the works under their charge. In the shops where the best records are made it has been found necessary merely to show that work can be done cheaply and establish paces which men are expected and required to carry out every day. A good method successfully followed in several shops is for the foreman to set the pace for the men on each machine.

IN commenting in our issue of February 29, 1896 upon the design of box car which has recently been brought out on the Chicago, Burlington & Quincy Railroad with ten inch steel I beams for center sills, it was remarked that the increase in weight due to the use of steel in the construction was not excessive although the exact amount added could not be stated at that time. It is now learned that the weight with this construction is actually thirteen hundred pounds less than that of the cars of similar arrangement except with wooden sills. This reduction in weight is very material and constitutes a strong recommendation for the use of steel in this way. The other chief advantages to be expected from steel sills are reduced cost of repairs and inspection, because the steel sills may be very easily examined, the increased value of the

sills in the way of contributing to the strength of the draft rigging and the freedom from decay which is a serious item with wooden sills. Against these advantages the only one to be considered upon the other side seems to be the risk of rather more serious damage or perhaps it would be better to say greater cost of repairs, in case of wrecking the cars. The danger of wrecking is growing less and the gain in the reduction of dead weight would seem to more than offset the risk of the steel sills becoming twisted up in wrecks. The cost of these steel center sills is but twenty-seven dollars per car more than that of the wooden ones so that the first cost cannot be considered prohibitive in any sense. The committee reporting upon steel center sills at the convention of M. C. B. Association in 1893 stated that steel underframes were at that time used as regular standard practice in the following foreign countries Germany, Belgium, Sweden, Norway, Russia, France, India and on some roads in Mexico. It can only be wondered at that this construction has had so limited a trial here.

A NEW rule has recently been added to the code governing the construction of interlocking signals on the Pennsylvania Lines West of Pittsburgh, which will simplify the rules and explanations pertaining to home signals. The rule consists of making all home signals uniform with respect to semaphore arms and lights, and will greatly assist engineers in the interpretation of signals at interlocking plants. A practice has been followed for several years requiring that where there are diverging routes a two arm signal is placed so as to inform the engineers as to which of the routes is clear for them. In such cases the top arm on these lines indicates for the main line or high speed route, and the lower arm indicates for all inferior or diverging routes. The use of the route signal has introduced an element of danger in that where there are diverging routes the lower arm might be cleared indicating for a siding or a Y connection and, if the top light should be out, an enginemen might not notice the situation until too late to prevent an accident. The trouble comes from the non-uniformity of the home signals and the necessity of carrying in mind at all times the places where two arm signals should be found. Mr. W. Mc. Grafton, signal engineer of the Pennsylvania Lines West of Pittsburgh has adopted the two arm signal for all home signals so that in every case two lights will be seen and if there are no diverging routes the bottom arm and light are fixed and serve only to carry out the uniformity, and to enable engineers to know positively whether lights are out or not. It is not known whether this plan was the product of accidents, but the idea of keeping a check upon extinguished lights is good, and is one which has been neglected. With this scheme engineers are not obliged to think whether there should be one or two lights, or any given signal, and with the multitude of signal lights in many large plants this is a very important item. There is one thing less to be remembered at each junction point. The extra light costs something—about three cents per day—and this is enough to bar some roads from using them, but they would seem to be a necessary adjunct to an ideally perfect system.

IN commenting recently in a paper before the Engineers' Club of St. Louis upon the differences between the arrangements of and the service at railway stations in this country and in Europe, Mr. George B. Leighton commends English practice and queries whether it might not be well for us to adopt the side door and elevated platforms which are found so convenient there. The Illinois Central and the elevated roads of Chicago and New York are mentioned as examples of satisfactory results with the abolition of car steps. The densest traffic is handled on these lines and it has proven to possess great advantages over the practice of using steps and low platforms, few of which are elevated more than eight inches above the level of the rail. The advantages of the high platform in these cases are admitted. They expedite the movement of passengers to and from trains and also materially add to the comfort of the passengers. Mr. Leighton sees that the side door is not to be thought of here but raises the question as to whether the tendency to use low platforms, now prevalent in this country, is not a mistaken one. A law has been enacted in Ohio which requires the distance between the lower car step and the platform to be not greater than fifteen inches. This is a valuable improvement and one without disadvantage. It is carried out in effect in some other states by the use of movable benches which, however, are highly dangerous. A moderate raising of the platforms is desirable and contributes to the comfort of passengers but as the question is brought periodically up with

regard to placing the platforms upon a level with the car floors, it seems well to suggest that there are some objections to this. It would be very expensive as with stations at an average of five mile intervals, the amount of platform building required for long lines will be enormous. Again, the high platforms in order to be safe must be carried close to the car sides which seriously interferes with the work of coupling cars and making the necessary inspection of the running gear at terminal points and intermediate stations. These objections do not apply to stations where a large suburban business is handled in special cars, and here the saving of a half minute in the time required to unload and load is of sufficient importance to justify even more expense than is required for the changes. For through trains the coach step is likely to remain until conditions change greatly from those which now obtain, but on suburban lines the sooner the change is made the better.

EFFECT OF SHOCKS ON CAST IRON.

The fatigue of metals caused by being subjected to repeated shocks has been a troublesome subject for engineers since the experiments of Wohler and Weyrauch, and the weakening effect of repeated stresses upon wrought iron and steel, whereby the application of a comparatively light load for a number of times causes the metal to finally give way under a load much less than it would have originally carried in safety, has been assumed to apply to cast iron as well as all other metals, and the idea that constant jarring or long continued jarring or vibration tends to make cast iron brittle is one pretty thoroughly fixed in the minds of many men, both engineers and others. It is a matter of fact established beyond question by Mr. Outerbridge in his paper, which is given in substance elsewhere in this issue, that cast iron instead of being weakened or made brittle by vibration, is actually toughened and strengthened by this treatment. Mr. Outerbridge states the case in the following emphatic terms: "The result of about a thousand tests of bars of cast iron of all grades from the softest foundry mixtures to the strongest car wheel metal, enables me to state with confidence that, within certain limits, cast iron is materially strengthened by subjection to shocks or repeated blows." The scientific and practical value of this discovery, for such it is, is very great, and is likely to effect the use of cast iron materially by relieving this material of some of the distrust with which it is now viewed, and justly so, on account of the uncertainty of whether the shrinkage stresses will cause failure or not.

The process of annealing castings has long been employed for relieving cooling stresses and thereby increasing the strength of the castings. A notable example of this is in the treatment of car wheels, which may safely be considered the greatest triumph in the handling of cast iron. The effect of the annealing has been understood to be a rearrangement of the molecules of the iron, or perhaps it had better be called a movement of the molecules to fill the positions into which the shrinkage stresses urge them. The work of this experimenter bears evidence of thoroughness, and his statement that the necessary movement of the molecules may be effected by jarring the casting without raising its temperature, is not disputed, and it seems entirely reasonable to suppose that the jarring would have the same effect upon the rearrangement as would the application of heat followed by slow cooling, heat being in itself a result of the movement of molecules. Heat is merely the energy of molecular motion due to an agitation of the molecules of matter. It seems proper to explain the effect of annealing by assuming that the molecules will gradually settle down in cooling into positions such that they will not crowd their neighbors. It does not seem unaccountable that the same effect should be produced by a jarring of the molecules, which must cause some vibration among them though probably not to the extent of the movement that is produced by heat.

The author of the paper had his attention directed to this interesting subject by noticing that chilled cast iron car wheels rarely cracked in ordinary service after having been used for any considerable time, and that if wheels did not crack when they were comparatively new they usually lasted until worn out or were condemned for other causes. The next step was made in the formation of theory after "tumbling" some test specimens of cast iron in order to remove the sand from them. Upon being tested they showed a remarkable increase of strength, which was attributed to the jarring action. The care with which the subject was followed up is indicated in the paper, and false theories were eliminated until there seems to be no doubt of the correct one having been found. The "crucial test" is worthy of note, and

shows that it is the jarring of the casting and not the contact with other castings which increases the strength. In this test the bars in question were given 3,000 taps with a hand hammer upon one end. Six bars were treated in this way with results which check those found with the castings which had been "tumbled." Mr. Outerbridge is entitled to great credit for the manner in which he has carried on his investigations, which seem likely to result in great good to those who are using this material. It has not been established by this author that the same rule applies to cast steel, yet it seems reasonable to suppose that such is the case, and it is hoped that experiments will be made to determine this question definitely. One value of this theory in foundry work which comes to mind, is that by means of this method of molecular annealing the same effect may be produced as if heat were used, and without effecting any change in the iron with regard to the chemical structure and the proportion of graphitic to combined carbon.

PRESS MISREPRESENTATIONS.

One of the regrettable things in modern journalism and which apparently reaches its highest state of development in Chicago, is the desire for sensationalism irrespective of truth. This mania, for such it undoubtedly is, is confined to no particular class of news, but of late has been much in evidence in connection with railway matters. It is not to be inferred that the gentlemen who report railway affairs for the daily press are wholly, if at all responsible for this state of affairs, as they are undoubtedly under instructions from their superiors, but that makes the case only the more lamentable. Were the effects of these misstatements merely local, no great harm would be done, but such news from Chicago as coming from the principal railroad center of the country is widely copied and generally read. A recent case in point is the sensational accounts appearing within the past week in the Chicago papers of the visit of a special agent of the Interstate Commerce Commission to Chicago, and the examination of a prominent railroad official in connection therewith, based upon some previously published reports by the daily press. Because of the wide currency given to this statement and to correct any misapprehension or anxiety that might be engendered in connection therewith, Mr. J. W. Midgley, who was the official in question wrote to the managers of the roads that he represents as commissioner, the following letter, and which is here published as a complete answer to the statements referred to:

WESTERN FREIGHT ASSOCIATION.

(Private.)—*Misleading Statements Regarding Dealings with the Commission.*

CHICAGO, April 4, 1896.

TO THE MANAGERS: You may have observed in one of the morning papers yesterday and to-day, highly sensational accounts of an alleged examination of the undersigned by a special agent of the Interstate Commerce Commission, because of the reported possession of evidence tending to incriminate certain parties. The facts are so at variance with the publications, that they had better be here stated.

On Wednesday last, a gentleman called and presented his card bearing the legend "John F. Marchand, representing the Interstate Commerce Commission." He produced a clipping from a daily paper, wherein it was stated that a circular had been issued by the undersigned reading the "riot act" to members for their alleged wrongdoing, and the article added that if the commission would bestir themselves and get hold of some of our "tell-tale circulars," they would find therein ample evidence to convict the roads referred to of violating the law. It was further stated that, to stop irregularities, a meeting of the interested lines had been called, and the wearisome and false assertion was repeated, that existing agreements were on the verge of disruption and demoralization was threatened, etc. I replied that the statements referred to were without foundation, and were on a par with numerous misrepresentations which had of late been made. This office had issued no embarrassing circulars, had no tangible evidence of cut rates, and could not obtain it, even though it should exist.

In response to a request to produce the circular letters on which the perverted statements were presumably based, I said that they contained no information which imparted to them a public interest, hence were privileged communications we were not required by law to expose. That position was cheerfully recognized, whereupon, knowing there was nothing troublesome in the circulars (both of which referred to an adjustment of grain rates from certain Iowa stations), I read them to the special agent. He at once pronounced them perfectly harmless, and, so far as he was concerned, entirely useless, and said that he did not want a copy of them, and none was obtained by him. He said that he could readily understand, after the reading, how utterly baseless were the statements which had been published, and would so report to his superiors.

The interview was of brief duration, possibly lasting thirty minutes, and not "several hours," as was stated in a

morning paper; and the "sweat box" was located solely in the fervid imagination of the reporter. As I was suffering from a cold, and have been for some weeks, I should have been quite willing to be "warmed up," but no such process was attempted, nor did anything occur, excepting a short and satisfactory interview with one I had not previously met, and who was gratified to learn that the suspicions previously entertained had no foundation in facts.

Yours respectfully,

J. W. MIDGLEY,
Commissioner.

The sequel to this story is that the representatives of the daily press have been refused further admission to the office of the Western Freight Association, which action although justifiable under the circumstances is in some degree unfortunate. The people of this country need to be informed concerning railway affairs. They have assumed through their representatives to regulate the operation of railways and in order to do so intelligently, need knowledge. The daily press are in a position to supply much of the needed information if only care is taken to get at the facts and to avoid misrepresentation. If the present attitude of the Chicago press is to be maintained, it would be better for the people as well as the roads if the example of Mr. Midgley were followed throughout the country and the entrance to all railroad offices denied to the press representatives. Railroads cannot afford nor can the people afford to have garbled and false statements spread broadcast throughout the land concerning the chief industry of present times. But rather than suppress knowledge it would be better for each railroad to have a duly appointed representative to give to the press daily all information in which the public is likely to be interested and insist as a condition precedent that it shall be correctly published.

There is one other phase of this subject that needs attention, and which is to a large degree responsible for the present state of affairs. Railroads have chosen to consider that their operations were not matters of public concern which is altogether a mistake. Railroads are not private property, at least so far as the function of transportation is concerned. Not only have the public have a right to know, but it will be much better for the railroads if they do know what is going on; only they need to know the facts. Many things that are now studiously concealed should be broadly published and if the present tendency to lower basis of earnings is to be checked must be published. The charge of misrepresentation does not lie against the press alone, but railroads have been manifestly guilty in this respect. It is high time the era of frankness and accuracy in connection with railway statements was inaugurated; a condition which the combined efforts of the press and the railroads are necessary to accomplish.

THE IMPORT RATE CASE.

The "import rate case," to which a large portion of our space in this issue is given, has attracted more attention than any recent finding of the United States supreme court. It is unfortunate that the railroads originally defendants in the case were not continued therein in order that important conditions which were absent in the case by reason of its limited application, could have been taken into account, and it is not impossible that had the import traffic to, through and from New York been considered the result might have been different.

It is, however, a matter of gratification to know that the decision confirms the position which has long been held by the RAILWAY REVIEW concerning import rates. In our issue of March 28, 1891, at the time the order of the commission in the case was made public, it was stated that by the decision "through rates between points in the United States and foreign countries are differentiated from through rates between distant points in the United States in that in the first case the through rates must be made up from the sum of the locals from the port of entry added to the ocean rates, while in the other, through rates may be any sum which shall be equal to, or more than, the largest local charge between the termini of any individual road participating therein.

The question of defining boundaries across which the accepted principles governing through rates may apply is at best a difficult and complex one. It is true that in the absence of such a regulation the importer at the port of entry may find it impossible to sell his goods to a dealer at some interior points, in competition with an importer located further inland who has the benefit of a through rate to such inland point. Or to illustrate: The importer in New York City who pays the steamship rate to that point, and adds the inland rate, cannot sell goods to a dealer in Chicago on equal terms with an importer located at the last named point, who has the benefit of a

through rate from the original port of shipment to destination. But is it necessary that he should? Is it contemplated under the act to regulate commerce that the dealer, and only the dealer in imported goods at the seaboard shall, through the medium of freight regulations, be placed upon an equality with all other dealers throughout the country in the matter of competition for trade? Or if otherwise, on what ground is the importer at the seaboard entitled to be placed by means of freight regulation, on an equality with the importer at an inland point, any more than is an inland merchant at an intermediate point entitled, as against a seaboard merchant, to the benefit of a similar regulation governing domestic shipments. It is true that in the absence of regulation the importer at the seaboard points cannot compete in some markets with the importer at the interior points; but it is also true that in the absence of such a regulation, the dealer in the manufactured goods at an intermediate interior point cannot buy his supplies at manufacturing points, and compete in all markets with the more distant dealers who ship direct from the point of manufacture to final destination. Such being the case, the question naturally arises what is the proper limitation, or boundary beyond which through rates may not extend; and should such limitations if at all allowable, be made effective at national, any more than at state boundaries, or those which may be determined by commercial conditions. If the question is one which is properly determinable by a consideration of conflicting interests as between localities, then the decision of the commission would seem to meet the case; but in that event, why should those men who deal in foreign commodities be specially favored in the operation of a rule, while those who deal in domestic commodities are subject to the operation of a different rule?

There is, however, another side to this question. Traffic is exchange, and in exchange more than one party is interested. Not only does traffic relate to the producer and the middleman, but to the consumer as well, and if he is to be considered as entitled to receive that which he needs on the best obtainable terms, then it would seem as if the contrary principle should apply, and that all transportation restrictions imposed by national, state or commercial boundaries, which add to his expense, should be removed. There would seem to be no necessary or equitable reason why an extra cost of carriage should be imposed upon the consumer in Chicago in order that the dealer in import goods in New York may be able to sell in Chicago on an equal basis with the importer located at the last named point, any more than should the consumer of cotton cloth in Chicago be obliged to pay an additional cost of carriage to the man in Chicago who ships direct from the mills in order that the dealer in Buffalo may reship to Chicago and supply the trade from that point.

Whatever may be thought as to this proposition, we submit that the equalizing of commercial conditions through the medium of rates of carriage is a wrongful application of the right to regulate commerce; and were it otherwise, so extensive and widely diversified is the application of the principle involved, as to make it practically impossible to enforce it in the degree which its admission would necessitate.

There would seem to be no reason for modifying this opinion. Politics may take recognition of state and national boundaries, but commerce will not. The genius of transportation is universal, and that which has compelled the abolition of state lines in the movement of the commerce of the country will sooner or later treat with equal indifference the boundary between countries, subject only to such interference as may be imposed by the exigencies of international policy. Modern methods of transportation are rapidly making all the nations of the earth of common kin, and those principles that are found to best promote commercial intercourse within a country will of necessity extend beyond it. The day is gone by when any nation or section thereof can live unto itself.

Incidentally the supreme court gives utterance to a principle which is suggestive as to the scope of the law beyond that which has commonly been attributed to it but for which this journal has strenuously contended. Referring to the law, the court interprets it to direct the commission "to take into consideration all the facts of the given case, among which are to be considered the welfare and advantage of the common carrier," and later in relation to charges it says: "Some charges might be unjust to shippers—others might be unjust to the carriers. The rights and interest of both must, under the terms of the act, be regarded by the commission." It has been a favorite idea with a large number of people that the force of the law and the efforts of the commission were to be exercised only in the protection

of the people against the railways. Even so eminent an authority as the Hon. T. M. Cooley, in an opinion delivered by him when chairman of the commission, held that the provisions in the act to regulate commerce concerning reasonable rates, "was a provision inserted for the protection of the general public and not for the protection of the carriers against the action of their own officers or against the action of rivals. The carriers were supposed to have means of self-protection against unreasonably low rates in the power they had to make the rates themselves." If any thing has been demonstrated as certain in connection with railway operation it is that carriers have not the power to make their own rates, but that others can make their rates for them and in spite of them. It is fortunate, therefore, that in the decision under consideration the supreme court expresses broadly the opinion that the interests of the carriers are entitled at the hands of the commission to equal consideration with those of the shippers, and it is to be hoped that the commission in accordance with the principle of equity thus enunciated will not hesitate to prescribe the limit of reasonableness in both directions when occasion offers.

Admission of Experienced Mechanics to Purdue University.

In response to numerous inquiries in regard to the admission of experienced mechanics to the engineering courses at Purdue University the following statement has been sent out embodying the practice of the university in such cases.

This University offers courses in mechanical, civil and electrical engineering. All of these courses include lines of work such as carpentry, pattern making, molding and casting, forging and machine work, with which shop men are often familiar, and for this reason such men may enter these courses under conditions which are greatly in their favor. Thus those who as apprentices have acquired skill in manipulation and have become acquainted with the principles of construction, can properly be excused from the shop work which other students are required to take; the experiences of the shop can in this way be made to count in advancing the student in his professional course. Or, if it happens that an applicant is unprepared in some line of work required for admission, such deficiency need not prevent his admission, provided his credits in shop work are sufficient to give him time in which to bring up the required preparatory work.

Each application for credit or for conditional admission will necessarily require individual consideration, and persons seeking such admission are advised to inform themselves by correspondence before going to the expense of applying in person. The important conditions, however, governing the admission of persons having credits and conditions are indicated in the following statements.

1. Each applicant for admission who desires credits in shop work must present a statement in his own handwriting setting forth his shop experience, which statement should be indorsed and approved by the superintendent of the shop or shops in which he has worked.
2. Three years' experience as a regular apprentice or as a journeyman in an approved shop will be accepted as a complete equivalent for all shop work required by the college course. It is equivalent to a credit of nine hours per week for two years. An experience of less than three years may be accepted as an equivalent for a portion of the shop work required in the course.
3. Applicants for admission who can show that they are entitled to credits in shop work, but who are unable to pass entrance examinations, will be admitted conditionally if their general attainments indicate that they are likely to become successful students; but such applicants should not be less than twenty years of age.
4. Students admitted as freshmen, with credits in one or more lines of college work and with conditions in preparatory subjects, will be given regular instruction in the subjects in which they are deficient.
5. Students admitted with conditions will be required to pursue such lines of study in some one of the three courses named as will tend to make them regular. Special courses of selected studies will not be granted.

ENGINEERS' CLUB OF ST. LOUIS.

A meeting of the Engineers' Club of St. Louis was held April 1, 1896, President Ockerson presiding. The executive committee reported the doings of its 212th meeting. An application of membership was announced from Mr. Albert Borden, of the engineering department of M. S. Carter & Company.

Mr. Julius Pitzman then read a paper on "Municipal Engineering," his address having special reference to the laying out of grades and subdivisions and of parks and public places. The paper was illustrated by numerous maps and diagrams indicating the character of grades already established in St. Louis and the serious mistakes which had been made in this work. Each plat also showed the grade which in the speaker's opinion should have been adopted. The enormous money losses due to these mistakes were also shown. Particular emphasis was laid upon the artistic features of the question, in order that the beauty and symmetry of our thoroughfares might be preserved. The essential features underlying the design of parks and boulevards were touched upon. The mistakes already made in our grades were, of course beyond remedy, but the author deemed it necessary to impress upon all good citizens the importance of avoiding similar errors in the future. He called attention to places where similar mistakes would in all probability be made in the near future unless proper steps were taken to prevent.

Messrs. Robt. Moore, Ockerson, R. E. McMath, MacKlind,

J. B. Johnson, and Spencer took part in the discussion, which was, on the whole, favorable to the speaker's ideas.

It was clearly brought out, however, that many difficulties surround the problem, and that the engineer could not always carry out his ideals, but must do the best he could within the limitations imposed upon him.

In our issue of last week the names of the members of the committee reporting upon the subject of interlocking signal rules to the Railway Signaling Club were omitted in presenting the report of the committee which was given in full on page 188. The committee deserves great credit for its able and thorough treatment of the subject. We regret the omission and take pleasure in publishing their names as follows: Mr. H. D. Miles, signal engineer Michigan Central Railroad, chairman; Mr. W. C. Nixon, superintendent terminals Atchison, Topeka & Santa Fe Railroad, and Mr. Henry M. Sperry, signal engineer and western agent of the National Switch & Signal Company.

THE IMPORT RATE CASE.

Below is appended the major portion of the decision of the supreme court of the United States, *in re* inland rates on import goods contracted through to destination on foreign bills of lading. Citations and statements in the case are omitted:

The object of the bill of complaint was to compel the defendant company to obey an order of the Interstate Commerce Commission, made on January 29, 1891, whereby the said defendant was ordered to "forthwith cease and desist from carrying any article of imported traffic shipped from any foreign port through any port of entry of the United States, or any port of entry in a foreign country adjacent to the United States, upon through bills of lading destined to any place within the United States, at any other than upon the inland tariff covering other freight from such port of entry to to such place of destination, or at any other than the same rates established in such inland tariff for the carriage of other like kind of freight, in the elements of bulk, weight, value and expense of carriage;" and which order the said defendant was alleged to have wholly disregarded and set at naught.

It appears by the bill that on March 23, 1889, the commission, of its own motion and without a hearing of the parties to be affected, had made a certain order wherein, among other things, it was provided as follows:

"Imported traffic transported to any place in the United States from a port of entry or place of reception, whether in this country or in an adjacent foreign country, is required to be taken on the inland tariff governing other freights." 2 Interstate Com. Com. Rep. 658.

As the Texas & Pacific Railway Company declined to observe said order, the commission filed its present bill against said company in the circuit court of the United States for the southern district of New York.

Mr. Justice Shiras delivered the opinion of the court.

After holding that the language of the statute, in creating the commission and in providing that it shall be lawful for the commission to apply by petition to the circuit court sitting in equity, sufficiently implies the intention of congress to create a body corporate with legal capacity to be a party plaintiff or defendant in the federal courts, the opinion continues:

We come now to the main question of the case, and that is whether the commission erred, when making the order of January 29, 1891, in not taking into consideration the ocean competition as constituting a dissimilar condition, and in holding that no circumstances and conditions which exist beyond the sea board in the United States could be legitimately regarded by them for the purpose of justifying a difference in rates between import and domestic traffic.

The answer of the Texas & Pacific Railway Co. to the petition of the New York Board of Trade and Transportation before the Interstate Commerce Commission, and the answer of said company to the petition of the commission filed in the circuit court, allege that rates for the transportation of commodities from Liverpool and London, England, to San Francisco, California, are in effect fixed and controlled by the competition of sailing vessels for the entire distance; by steamships and sailing vessels in connection with railroads across the Isthmus of Panama; by steamships and sailing vessels from Europe to New Orleans, connecting these under through arrangements with the Southern Pacific Co., to San Francisco—That unless the defendant company charges substantially the rates specified in its answer, it would be prevented, by reason of the competition aforesaid, from engaging in the carrying and transportation of property and import traffic from Liverpool and London to San Francisco, and would lose the revenue derived by it therefrom, which is considerable, and important and valuable to said company—That the rates charged by it are not to the prejudice or disadvantage of New Orleans, and work no injury to that community, because if said company is prevented from participating in said traffic, such traffic would move via the other routes and lines aforesaid without benefit to New Orleans, but, on the contrary, to its disadvantage—That the foreign or import traffic is upon orders by persons, firms, and corporations in San Francisco and vicinity buying direct of first hands in London, Liverpool, and other European markets, and if the order of the commission should be carried into effect it would not result in discontinuance of that practice or in inducing them to buy in New Orleans in any event—That the result of the order would be to injuriously affect the defendant company in the carriage of

articles of foreign imports to Memphis, St. Louis, Kansas City, and other Missouri river points—That by such order the defendant company would be prevented from competing for freight to important points in the state of Texas with the railroad system of that state, having Galveston as a receiving port, and which railroad system is not subject to the control of the Interstate Commerce Commission. These allegations of the answer were not traversed or denied by the commission, but are confirmed by the findings of the commission attached as an exhibit to the petition in the case; and by said findings it further appears that the proportion the Texas & Pacific Railway receives of the through rate is remunerative—that the preponderance of its empty cars go north during eight months of the year, and if something can be obtained to load, it is that much found, and anything is regarded as remunerative that can be obtained to put in its cars to pay mileage—that the competition which controls the making of rates to the Pacific coast is steamship by way of the Isthmus and in cheap heavy goods around Cape Horn—that the competition to interior points, such as Missouri river points and Denver, is from the trunk lines direct from the Atlantic seaboard—that the ships engaged in carrying to San Francisco around Cape Horn are almost wholly British bottoms—that the through bill of lading furnishes a collateral for the transaction of business; takes from the shipper and consignee both the care as to intermediate charges, elevators, wharves, and cost of handling, and puts it on the carrier; it reduces the intermediate charges, very much facilitates the transaction of business, and helps to swell its volume; that the tendency of the through bill of lading is to eliminate the obstacles between the producer and consumer, and it has done much in that direction.

These and other uncontroverted facts that appear in this record would seem to constitute "circumstances and condition" worthy of consideration, when carriers are charged with being guilty of unjust discrimination or of giving unreasonable and undue preference or advantage to any person or locality.

But we understand the view of the commission to have been that it was not competent for the commission to consider such facts—that it was shut up by the terms of the act of congress, to consider only such "circumstances and conditions" as pertained to the articles of traffic after they had reached and been delivered at a port of the United States or Canada.

It is proper that we should give the views of the commission in its own words. [Here follows a long extract from the opinion of the commission, 4 Interstate Com. Rep. 512-516, q. v.]

It is obvious, therefore, that the commission in formulating the order of January 29, 1891, acted upon that view of the meaning of the statute which is expressed in the foregoing passages.

We have, therefore, to deal only with a question of law, and that is what is the true construction, in respect to the matters involved in the present controversy, of the act to regulate commerce? If the construction put upon the act by the commission was right, then the order was lawful; otherwise it was not.

Before we consider the phraseology of the statute it may be well to advert to the causes which induced its enactment. They chiefly grew out of the use of railroads as the principal modern instrumentality of commerce. While shippers of merchandise are under no legal necessity to use railroads, practically they are. The demand for speedy and prompt movement virtually forbids the employment of slow and old fashioned methods of transportation, at least in the case of the more valuable articles of traffic. At the same time, the immense outlay of money required to build and maintain railroads, and the necessity of resorting, in securing the rights of way, to the power of eminent domain, in effect disable individual merchants and shippers from themselves providing such means of carriage. From the very nature of the case, therefore, railroads are monopolies, and the evils that usually accompany monopolies soon began to show themselves and were the cause of loud complaints. The companies owning the railroads were charged, and sometimes truthfully, with making unjust discriminations between shippers and localities, with making secret agreements with some to the detriment of other patrons, and with making pools or combinations with each other, leading to oppression of entire communities.

Some of these mischiefs were partially remedied by special provisions inserted in the charters of the companies, and by general enactments by the several states, such as clauses restricting the rates of toll, and forbidding railroad companies from becoming concerned in the sale or production of articles carried, and from making unjust preferences. Relief to some extent was likewise found in the action of the courts in enforcing the principles of the common law applicable to common carriers—particularly that one which requires uniformity of treatment in like conditions of service.

As, however, the powers of the states were restricted to their own territories, and did not enable them to efficiently control the management of great corporations whose roads extend through the entire country, there was a general demand that congress in the exercise of its plenary power over the subject of foreign and interstate commerce should deal with the evils complained of by a general enactment, and the statute in question was the result.

The scope or purpose of the act is, as declared in its title, to regulate commerce. It would, therefore, in advance of an examination of the text of the act, be reasonable to anticipate that the legislation would cover or have regard to the entire field of foreign and interstate commerce, and that its scheme of regulation would not be restricted to a partial treatment of the subject. So too, it could not be readily supposed that congress intended when regulating such commerce to interfere with and interrupt, much less destroy, sources of trade and commerce already existing, nor to overlook the property rights of those who had invested money in the railroads of the country, nor to disregard the interests of the consumers, to furnish whom with merchandise is one of the principal objects of all systems of transportation.

Addressing ourselves to the express language of the statute, we find in its first section that the carriers that are declared to be subject to the act are those "engaged in the transportation of passengers or property wholly

by railroad, or partly by railroad and partly by water when both are used, under a common control, management or arrangement, for a continuous carriage or shipment, from one state or territory of the United States, or the District of Columbia, or from any place in the United States to an adjacent foreign country, or from any place in the United States through a foreign country to any other place in the United States and also to the transportation in like manner of property shipped from any place in the United States to a foreign country and carried from such place to a port of transshipment, or shipped from a foreign country to any place in the United States and carried to such place from a port of entry either in the United States or an adjacent foreign country."

It would be difficult to use language more unmistakably signifying that congress had in view the whole field of commerce (excepting commerce wholly within a state) as well that between the states and territories as that going to or coming from foreign countries.

In a later part of the section it is declared that "the term 'transportation' shall include all instrumentalities of shipment or carriage."

Having thus included in its scope the entire commerce of the United States, foreign and interstate, and subjected to its regulations all carriers engaged in the transportation of passengers or property, by whatever instrumentalities of shipment or carriage, the section proceeds to declare that "all charges made for any service rendered or to be rendered in the transportation of passengers or property as aforesaid, or in connection therewith, or for the receiving, delivering, storage, or handling of such property, shall be reasonable and just, and every unjust and unreasonable charge for such service is prohibited and declared to be unlawful."

The significance of this language, in thus extending the judgment of the tribunal established to enforce the provisions of the act to the entire service to be performed by carriers, is obvious.

Proceeding to the second section, we learn that its terms forbid any common carrier, subject to the provisions of the act, from charging, demanding, collecting or receiving "from any person or persons a greater or less compensation for any service rendered or to be rendered, in the transportation of passengers or property, subject to provisions of the act, than it charges, demands, collects, or receives from any other person or persons for doing or him or them a like and contemporaneous service in the transportation of a like kind of traffic under substantially similar circumstances and conditions," and declares that disregard of such prohibition shall be deemed "unjust discrimination," and unlawful.

Here, again, it is observable that this section contemplates that there shall be a tribunal capable of determining whether "in given cases, the services rendered are 'like and contemporaneous' whether the respective traffic is of a like kind" and whether the transportation is under "substantially similar circumstances and conditions."

The third section makes it "unlawful for any common carrier, subject to the provisions of the act, to make or give any undue or unreasonable preference or advantage to any particular person, company, firm, corporation, or locality, any particular description of traffic, in any respect whatsoever, or to subject any particular person, company, firm, corporation or locality to any undue or unreasonable prejudice or disadvantage in any respect whatever." It also provides that every such common carrier shall afford "all reasonable, proper and equal facilities for the interchange of traffic between their respective lines, and for the receiving, forwarding and delivering of passengers and property to and from their respective lines and those connecting therewith, and shall not discriminate in their rates and charges between such connecting lines."

The fourth section makes it unlawful for any such common carrier to "charge or receive any greater compensation in the aggregate for the transportation of passengers or of like kind of property, under substantially similar circumstances and conditions for a shorter than for a longer distance over the same line, in the same direction, the shorter being within the longer distance, but this shall not be construed as authorizing any such common carrier to charge and receive as great compensation for a shorter as for a longer distance," and provision is likewise made that, "upon application to the commission appointed under the provisions of the act, such common carrier may, in special cases, after investigation by the commission, be authorized to charge less for longer than for shorter distances for the transportation of passengers or property;" and that "the commission may from time to time prescribe the extent to which such designated common carrier may be relieved from the operation of this section of the act."

The powers of the Interstate Commission are not very clearly defined in the act, nor is its method of procedure very distinctly outlined. It is, however, declared in the 12th section, as amended March 2, 1889, and February 10, 1891, that the commission "shall have authority to inquire into the management of the business of all common carriers subject to the provisions of the act, and shall keep itself informed as to the manner and method in which the same is conducted, and shall have the right to obtain from such common carriers full and complete information necessary to enable the commission to perform the duties and carry out the objects for which it was created; and the commission is hereby authorized and required to execute and enforce the provisions of the act." It is also made the duty of any district attorney of the United States to whom the commission may apply to institute in the proper court, and to prosecute under the direction of the attorney-general of the United States all necessary proceedings for the enforcement of the provisions of the act and for the punishment of all violations thereof. And provision is made for complaints to be made by any person, firm, corporation, association, or any mercantile, agricultural or manufacturing society, or any body politic or municipal organization, before the commission; and for an investigation of such complaints to be made by the commission; and it is made the duty of the commission to make reports in writing in respect thereof, which shall include the findings of fact upon which the conclusions of the commission are based, together with its recommendation as to what reparation, if any, should be made by any common carrier to any party or parties who may be found to have been injured; and such findings so made shall thereafter in all judicial pro-

ceedings be deemed prima facie evidence as to each and any fact found.

In the present case no complaint seems to have been made before the commission by any person, firm, company, or other organization against the Texas & Pacific Railway Company, of any disregard by said company of any provision of the statute resulting in any specific loss or damage to any one, nor has the commission, in its findings, disclosed any such loss or damage to any individual complainant. And it is made one of the contentions of the defendant company that the entire proceeding was outside of the sphere of action appointed by the act to the commission, which only had power, as claimed by defendant, to inquire into complaint made by some person or body injured by some described act of the defendant company.

The complaint in the present case was made by certain corporations of New York, Philadelphia and San Francisco, known as boards of trade, or chambers of commerce, which appear to be composed of merchants and traders in those cities, engaged in the business of reaching and supplying the consumers of the United States with imported luxuries, necessities and manufactured goods generally, and as active competitors with the merchants at Boston, Montreal, Philadelphia, New Orleans, San Francisco, Chicago, and merchants in foreign countries who import direct on through bills of lading issued abroad.

We shall assume, in the disposition of the present case, that a valid complaint may be made before the commission, by such trade organizations, based on a mode or manner of treating import traffic by a defendant company, without disclosing or containing charges of specific acts of discrimination or undue preference, resulting in loss or damage to individual persons, corporations, or associations.

We do not wish to be understood as implying that it would be competent for the commission, without a complaint made before it, and without a hearing to subject common carriers to penalties. It is also obvious that if the commission does have the power, of its own motion, to promulgate general decrees or orders which thereby become rules of action to common carriers, such exercise of power must be confined to the obvious purposes and directions of the statute. Congress has not seen fit to grant legislative powers to the commission.

With these provisions of the act and these general principles in mind, we now come to consider the case in hand.

After an investigation made by the commission on a complaint against the Texas & Pacific R. Co. and other companies by the boards of trade above mentioned, the result reached was the order of the commission made on January 29, 1891, a disregard of which was complained of by the commission in its bill or petition filed in the circuit court of the United States.

The Texas & Pacific R. Co., a corporation created by laws of the United States, and also possessed of certain grants from the state of Texas, owns a railroad extending from the city of New Orleans, through the state of Texas, to El Paso, where it connects with the railroad of the Southern Pacific Co., the two roads forming a through route to San Francisco. The Texas & Pacific R. Co. has likewise connections with other railroads and steamers forming through freight lines to Memphis, St. Louis and other points on the Missouri river and elsewhere.

The defendant company admitted that, as a scheme or mode of obtaining foreign traffic, it had agencies by which and by the use of through bills of lading, it secured shipments of merchandise from Liverpool and London, and other European ports, to San Francisco and to the other inland points named. It alleged that in order to get this traffic it was necessary to give through rates from the places of shipment to the places of final destination, and that in fixing said rates, it was controlled by an ocean competition by sailing and steam vessels by way of the isthmus and around the Horn, and also to some extent by a competition through the Canada route to the Pacific coast. These rates, so fixed and controlled, left to the defendant company and to the Southern Pacific Co. as their share of the charges made and collected less than the local charges of said companies in transporting similar merchandise from New Orleans to San Francisco, and so, too, as to foreign merchandise carried to other inland points. The defendant further alleged that unless it used said means to get such traffic the merchandise to the Pacific coast would none of it reach New Orleans, but would go by the other means of transportation; that neither the community of New Orleans nor any merchant or shipper thereof was injured or made complaint—that the traffic thus secured was remunerative to the railway company and was obviously beneficial to the consumers at the places of destination, who were thus enabled to get their goods at lower rates than would prevail if this custom of through rates was destroyed.

As we have already stated, the commission did not charge or find that the local rates charged by the defendant company were unreasonable, nor did they find that any complaint was made by the city of New Orleans, or by any person or organization there doing business. Much less did they find that any complaint was made by the localities to which this traffic was carried, or that any cause for such complaint existed.

The commission justified its action wholly upon the construction put by it on the act to regulate commerce, as forbidding the commission to consider the "circumstances and conditions" attendant upon the foreign traffic as such "circumstances and conditions" as they are directed in the act to consider. The commission thought it was constrained by the act to regard foreign and domestic traffic as like kinds of traffic under substantially similar circumstances and conditions, and that the action of the defendant company in procuring through traffic that would, except for the through rates, not reach the port of New Orleans, and it taking its pro rata share of such rates, was an act of "unjust discrimination," with the meaning of the act.

In so constructing the act we think the commission erred.

As we have already said, it could not be supposed that congress, in regulating commerce, would intend to forbid or destroy an existing branch of commerce, of value to the common carriers and to the consumers within the United States. Clearly, express language must be used in the act to justify such a supposition.

So far from finding such language, we read the act in question to direct the commission, when asked to find a common carrier guilty of a disregard of the act, to take

into consideration all the facts of the given case—among which are to be considered the welfare and advantage of the common carrier, and of the great body of the citizens of the United States who constitute the consumers and recipients of the merchandise carried; and that the attention of the commission is not to be confined to the advantage of shippers or merchants who deal at or near the ports of the United States, in articles of domestic production. Undoubtedly the latter are likewise entitled to be considered; but we cannot concede that the commission is shut up by the terms of this act to solely regard the complaints of one class of the community. We think that congress here pointed out that, in considering questions of this sort, the commission is not only to consider the wishes and interest of the shippers and merchants of large cities, but to consider also the desire and advantage of the carriers in securing special forms of traffic, and the interest of the public that the carriers should secure that traffic, rather than abandon it, or not attempt to secure it. It is self evident that many cases may and do arise where, although the object of the carriers is to secure the traffic for their own purposes and upon their own lines, yet, nevertheless, the very fact that they seek, by the charges they make, to secure it, operates in the interest of the public.

Moreover, it must not be overlooked that this legislation is experimental. Even in constructing the terms a statute, courts must take notice of the history of legislation, and, out of different possible constructions select and apply the one that best comports with the genius of our institutions and, therefore, most likely to have been the construction intended by the law-making power. Commerce, in its largest sense, must be deemed to be one of the most important subjects of legislation, and an intention to promote and facilitate it, and not to hamper or destroy it, is naturally to be attributed to congress. The very terms of the statute, that charges must be reasonable, that discrimination must not be unjust, and that preference or advantage to any particular person, firm, corporation, or locality must not be undue or unreasonable, necessarily imply that strict uniformity is not to be enforced; but that all circumstances and conditions which reasonable men would regard as affecting the welfare of the carrying companies, and of the producers, shippers and consumers, should be considered by a tribunal appointed to carry into effect and enforce the provisions of the act.

The principal purpose of the second section is to prevent unjust discrimination between shippers. It implies that, in deciding whether differences in charges, in given cases, were or were not unjust, there must be a consideration of the several questions whether the services rendered were "like and contemporaneous," whether the kinds of traffic were "like," whether the transportation was effected under "substantially similar circumstances and conditions." To answer such questions, in any case coming before the commission, requires an investigation into the facts; and we think that congress must have intended that whatever would be regarded by common carriers, apart from the operation of the statute, as matters which warranted differences in charges, ought to be considered in forming a judgment whether such differences were or were not "unjust." Some charges might be unjust to shippers—others might be unjust to the carriers. The rights and interests of both must, under the terms of the act, be regarded by the commission.

The third section forbids any undue or unreasonable preference or advantage in favor of any person, company, firm, corporation, or locality; and as there is nothing in the act which defines what shall be held to be undue or unreasonable, such questions are questions not of law, but of fact. The mere circumstance that there is in a given case, a preference or an advantage does not of itself show that such preference or advantage is undue or unreasonable within the meaning of the act. Hence it follows that before the commission can adjudge a common carrier to have acted unlawfully it must ascertain the facts; and here again we think it evident that those facts and matters which carriers, apart from any question arising under the statute, would treat as calling, in given cases, for a preference or advantage, are facts and matters which must be considered by the commission in forming its judgment whether such preference or advantage is undue or unreasonable. When the section says that no locality shall be subjected to any undue or unreasonable prejudice or disadvantage in any respect whatsoever, it does not mean that the commission is to regard only the welfare of the locality or community where the traffic originates, or where the goods are shipped on the cars. The welfare of the locality to which the goods are sent is also, under the terms and spirit of the act, to enter into the question.

The same observations are applicable to the fourth section, or the so-called long and short haul provision, and it is unnecessary to repeat them.

The only argument, urged in favor of the view of the commission, that is drawn from the language of the statute, is found in those provisions of the statute that make it obligatory on the common carriers to publish their rates, and to file with the commission copies of joint tariffs of rates or charges over continuous lines or routes operated by more than one common carrier; and it is said that the place at which it would seem that joint rates should be published for the information of shippers would be at the place of origin of the freight, and that this cannot be done, or be compelled to be done in foreign ports.

The force of this contention is not perceived. Room is left for the application of these provisions to traffic originating within the limits of the United States, even if, for any reason, they are not practically applicable to traffic originating elsewhere. Nor does it appear that the commission may not compel all common carriers within the reach of their jurisdiction to publish such rates, and to furnish the commission with all statements or reports prescribed by the statute. Nor was there any allegation, evidence, or finding, in the present case, that the Texas & Pacific Railway Company has failed to file with the commission copies of its joint tariffs, showing the joint rates from English ports to San Francisco, nor that the company has failed to make public such joint rates in such manner as the commission may have directed.

Another position taken by the commission in its report, and defended in the briefs of counsel, is that it is the duty of the commission to so construe the act to regulate com-

merce as to make it practically co-operate with what is assumed to be the policy of the tariff laws. This view is thus stated in the report.

"One paramount purpose of the act to regulate commerce, manifest in all its provisions, is to give to all dealers and shippers the same rates for similar services rendered by the carrier in transporting similar freight over its line. Now, it is apparent from the evidence in this case, that many American manufacturers, dealers and localities, in almost every line of manufacture and business, are the competitors of foreign manufacturers, dealers and localities, for supplying the wants of American consumers at interior places in the United States, and that under domestic bills of lading they seek to require from American carriers like service as their foreign competitors in order to place their manufactured goods, property, and merchandise with interior consumers. The act to regulate commerce secures them this right. To deprive them of it by any course of transportation business or device is to violate the statute. 4 Interstate Commerce Commission Rep. 514,515.

Our reading of the act does not disclose any purpose or intention, on the part of congress, to thereby reinforce the provisions of the tariff laws. These laws differ wholly in their objects from the law to regulate commerce. Their main purpose is to collect revenues with which to meet the expenditures of the government, and those of their provisions, whereby congress seeks to so adjust rates as to protect American manufacturers and producers from competition by foreign low-priced labor, operate equally in all parts of the country.

The effort of the commission, by a rigid general order, to deprive the inland consumers of the advantage of through rates, and to thus give an advantage to the traders and manufacturers of the large sea board cities, seems to create the very mischief which it was one of the objects of the act to remedy.

Similar legislation by the parliament of England may render it profitable to examine some of the decisions of the courts of that country construing its provisions. [Here follows a long list of citations.]

The conclusions that we draw from the history and language of the act, and from the decisions of our own and the English courts, are mainly these: That the purpose of the act is to promote and facilitate commerce by the adoption of regulations to make charges for transportation just and reasonable, and to forbid undue and unreasonable preferences or discriminations: That, in passing upon questions arising under the act, the tribunal appointed to enforce its provisions, whether the commission or the courts, is empowered to fully consider all the circumstances and conditions that reasonably apply to the situation, and that, in the exercise of its jurisdiction, the tribunal may and should consider the legitimate interests as well of the carrying companies as of traders and shippers, and in considering whether any particular locality is subjected to an undue preference or disadvantage the welfare of the communities occupying the localities where the goods are delivered is to be considered as well as that of the communities which are in the locality of the place of shipment: That among the circumstances and conditions to be considered as well in the case of traffic originating in foreign ports as in the case of traffic originating within the limits of the United States, competition that affects rates should be considered, and in deciding whether rates and charges made at a low rate to secure foreign freights which would otherwise go by other competitive routes are or are not undue and unjust, the fair interests of the carrier companies and the welfare of the community which is to receive and consume the commodities are to be considered: That if the commission, instead of confining its action to redressing, on complaint made by some particular person, firm, corporation, or locality, some specific disregard by common carriers of provisions of the act, proposes to promulgate general orders, which thereby become rules of action to the carrying companies, the spirit and letter of the act require that such orders should have in view the purpose of promoting and facilitating commerce, and the welfare of all to be affected, as well the carriers as the traders and consumers of the country.

It may be said that it would be impossible for the commission to frame a general order if it were necessary to enter upon so wide a field of investigation, and if all interests that are liable to be affected were to be considered. This criticism, if well founded, would go to show that such orders are instances of general legislation, requiring an exercise of the law-making power, and that the general orders made by the commission in March, 1889, and January, 1891, instead of being regulations calculated to promote commerce and enforce the express provisions of the act, are themselves laws of wide import destroying some branches of commerce that have long existed, and undertaking to change the laws and customs of transportation in the promotion of what is supposed to be public policy.

This is manifest from the facts furnished us in the report and findings of the commission, attached as an exhibit to the bill filed in the circuit court.

It is stated in that report that the Illinois Central R. Co. one of the respondents in the proceedings before the commission, averred in its answer that it was constrained by its obedience to the order of March 1889, to decline to take for shipment any import traffic, and to its great detriment to refrain from the business, for the reason that to meet the action of the competing lines it would have to make a less rate on the import than on the domestic traffic.

Upon this disclosure that their order had resulted in depriving the company of a valuable part of its traffic (to say nothing of its necessary effect in increasing the charges to be finally paid by the consumers) the commission in its report naively remarks: "This lets the Illinois Central Ry. Co. out." 4 Interstate Com. Com. Rep. 458.

We also learn from the same source that there was competent evidence adduced before the commission, on the part of the Pennsylvania Railroad Company, that since that company, in obedience to the order of March 1889, has charged the full inland rate on the import traffic, the road's business in that particular has considerably fallen off—that the steamship lines have never assented to the road's charging its full inland rates, and have been making demands on the road for a proper division of the through rate—that if it were definitely determined that the road was not at liberty to charge less than the full inland rate, the result would be that it would effectually

close every steamship line sailing to and from Baltimore and Philadelphia.

The commission did not find it necessary to consider this evidence because the Pennsylvania Railroad Company was before it in the attitude of having obeyed the order.

We do not refer to these matters for the purpose of indicating what conclusions ought to have been reached by the commission or by the courts below in respect to what were proper rates to be charged by the Texas & Pacific Railway Company. That was a question of fact, and if the inquiry had been conducted on a proper basis we should not have felt inclined to review conclusions so reached. But we mention them to show that there manifestly was error in excluding facts and circumstances that ought to have been considered and that this error arose out of a misconception of the purpose and meaning of the act.

The circuit court held that the order of January 29, 1891, was a lawful order, and enjoined the defendant company from carrying any article of import traffic shipped from any foreign port through any port of entry in the United States, or any port of entry in a foreign country adjacent to the United States, upon through bills of lading, and destined to any place within the United States, upon any other than the published inland tariff covering the transportation of other freight of like kind over its line from such port of entry to such place of destination, or from charging or accepting for its share of through rates upon imported traffic a lower sum than it charges or receives for domestic traffic of like kind to the same destination from the point at which the imported traffic enters the country.

In treating the facts of the case the court says: "It must be conceded as true, for the purposes of the present case, that the rates for the transportation of traffic from Liverpool and London to San Francisco are in effect fixed and controlled by the competition of sailing vessels between these ports, and also by the competition of steamships and sailing vessels in connection with railroads across the isthmus of Panama, none of which are in any respect subject to the act to regulate commerce. It must also be conceded that the favorable rates given to the foreign traffic are, for reasons to which it is now unnecessary to revert, somewhat remunerative to the defendant; and it must also be conceded that the defendant would lose the foreign traffic by reason of the competition referred to, and the revenue derived therefrom, unless it carries at the lower rates, and by so doing is enabled to get part of it which would otherwise go from London and Liverpool to San Francisco around the Horn by way of the isthmus." (52 Fed. Rep. 187.)

The circuit court did not discuss the case at length, either as to its law or facts, but in effect approved the order of January 29, 1891, as valid, and enjoined the defendant company from disregarding it.

The circuit court of appeals seems to have disapproved of the construction put on the act by the commission. The language of the court was as follows: "The commission contended that the defendant had violated the second section of the act to regulate commerce, which prohibits unjust discrimination in the compensation charged for like and contemporaneous service in the transportation of a like kind of traffic under substantially similar circumstances and conditions, and had also violated the third section, which prohibits any undue or unreasonable preference or advantage to any particular description of traffic. The defendant insisted that the dissimilar conditions growing out of the ocean competition freed its conduct from the prohibition of the statute. The commission held that this class of dissimilar conditions was not in contemplation of the statute and was not to be regarded in the regulation of inland tariffs of rates." Then after citing a passage from the report of the commission, the court proceeded to say: "Its conclusion was that foreign and home merchandise under the operation of the statute, when handled and transferred by interstate carriers engaged in carriage in the United States, stand exactly upon the same basis of equality as to tolls, charges and treatment for similar services rendered." This rule, having been founded upon a construction of the statute, is a very broad one. It is applicable to all the foreign circumstances and conditions which affect rates, and the question whether it must be universally applied without regard to any circumstances which may exist in a foreign country, and whether dissimilarities which have a foreign origin are to be excluded from consideration under the operation of the statute, is an exceedingly important one, the ultimate decision of which may have a wider influence upon the interstate commerce of the country than we can foresee. This legal question was not discussed in the export rate case, which was treated as one of practical policy. We are not disposed to pass authoritatively upon this question, except in a case which demands it, and in which the effect of this construction of the statute is naturally the subject of discussion." 20 U. S. App. 6-9.

Having thus intimated its dissent from, or, at least, its distrust of, the view of the commission, the court proceeded to affirm the decree of the circuit court and the validity of the order of the commission, upon the ground that, even if ocean competition should be regarded as creating a dissimilar condition, yet that, in the present case, the disparity in rates was too great to be justified by that condition.

This course proceeded, we think, upon an erroneous view of the position of the case. That question was not presented to the consideration of the court. There was no allegation in the Commission's bill or petition that the inland rates charged by the defendant company were unreasonable. That issue was not presented. The defendant company was not called upon to make any allegation on the subject. No testimony was adduced by either party on such an issue. What the commission complained of was that the defendant refused to recognize the lawfulness of its order; and what the defendant asserted, by way of defence, was that the order was invalid, because the commission had avowedly declined to consider certain "circumstances and conditions" which, under a proper construction of the act, it ought to have considered.

If the circuit court of appeals were of opinion that the commission in making its order had misconceived the extent of its powers, and if the circuit court had erred in affirming the validity of an order made under such misconception, the duty of the circuit court of appeals was to reverse the decree, set aside the order, and remand the

cause to the commission, in order that it might, if it saw fit, proceed therein according to law. The defendant was entitled to have its defense considered, in the first instance, at least, by the commission upon a full consideration of all the circumstances and conditions upon which a legitimate order could be founded. The questions whether certain charges were reasonable or otherwise, whether certain discriminations were due or undue, were questions of facts, to be passed upon by the commission in the light of all facts duly alleged and supported by competent evidence, and it did not comport with the true scheme of the statute that the circuit court of appeals should undertake, of its own motion, to find and pass upon such questions of fact, in a case in the position in which the present one was.

We do not, of course, mean to imply that the commission may not directly institute proceedings in a circuit court of the United States charging a common carrier with disregard of provisions of the act, and that thus it may become the duty of the court to try the case in the first instance. Nor can it be denied that, even when a petition is filed by the commission for the purpose of enforcing an order of its own, the court is authorized to "hear and determine the matter as a court of equity," which necessarily implies that the court is not concluded by the findings or conclusions of the commission; yet as the act provides that, on such hearing, the findings of fact in the report of said commission shall be prima facie evidence of the matters therein stated, we think in plain that if, in such a case, the commission has failed in its proceedings to give notice to the alleged offender, or has unduly restricted its inquiries upon a mistaken view of the law, the court ought not to accept the findings of the commission as a legal basis for its own action, but should either inquire into the facts on its own account, or send the case back to the commission to be lawfully proceeded in.

The mere fact that the disparity between the through and the local rates was considerable did not, of itself, warrant the court in finding that such disparity constituted an undue discrimination—much less did it justify the court in finding that the entire difference between the two rates was undue or unreasonable, especially as there was no person, firm, or corporation complaining that he or they had been aggrieved by such disparity.

The decree of the circuit court of appeals is reversed; the decree of the circuit court is also reversed, and the cause is remanded to that court, with directions to dismiss the bill.

NOTICES OF PUBLICATIONS.

LINK BELT MACHINERY COMPANY'S MODERN METHODS, MINING AND HANDLING COAL, MINERALS, ETC. Catalog 20, pp. 69, standard size, 6x9 in.

This pamphlet contains the announcement that in addition to the well known machinery specialties for which the Link Belt Machinery Co. has become noted, the concern has engaged in the manufacture of what is known as the "Independent" line of electric coal mining machinery, having recently absorbed this part of the Independent Electric Company's business. The statement is made that electric coal mining machinery has been put upon a thoroughly practical basis which admits of accurately estimating the advantages resulting from its employment. The practical operation of machine plants proves that mechanical mining is more economical than hand work and that coal is produced in better condition. The workings in the mine are concentrated, the expense of dead work reduced, the entries driven and rooms turned more cheaply. Besides these advantages is the one of having power ready at hand for drilling, hauling, hoisting, ventilating, pumping and lighting. The illustrations cover a considerable range of machinery for mechanical mining, pumping and drilling, and also trolley supports, switch-boards and ventilating fans. The latter portion of the book is devoted to illustrating the Link Belt Company's coal handling appliances, describing machinery for transporting as well as preparing coal for the market. The illustrations are wood cuts and half-tone engravings from photographs. The letter press is good and the devices shown are interesting.

The Century for April contains for a frontispiece a beautiful engraving by Cole after George De Forest Brush's painting entitled "Mother and Child," and Mr. Castaigne furnishes the illustrations for a timely article by Prof. Allen Marquand, of Princeton, on "The Old Olympic Games" apropos of the revival of the Olympic festival at Athens. Mr. Castaigne's reproductions, carefully studied from authentic artistic sources, have all the vigor of drawings from the life, and will increase his popular reputation as a creator of intellectual and beautiful art. Prof. Marquand's article is an entertaining popular account of the games, and will be of special interest at the present time. Prof. Sloane's "Napoleon" is particularly rich in illustrations. He treats of Napoleon as the assailant of nationality, of the Spanish campaign, and of the rise of Germany under the lead of Prussia. An article by Victor Louis Mason, an attaché of the war department, is entitled "Four Lincoln Conspiracies," and makes record of the three attempts to murder and one to kidnap, and includes new particulars of the flight and capture of the assassin. The illustrations are chiefly from archives of the war department, nearly all of which are unpublished, and comprise photographs of the conspirators in irons, documents in Booth's handwriting, scenes along the route of his escape, etc. An amusing article on a subject of current interest is Mr. D. P. B. Conkling's article on "Japanese War Posters," with four illustrations. Mrs. Schuyler Van Rensselaer, author of "English Cathedrals," contributes a paper on "The Churches of Perigueux and Angouleme," with illustrations by Joseph Pennell, and the series of stories and sketches by the printer Vibert comes to a conclusion with three diverting examples, including a one-act comedy. There is a liberal instalment of "Sir George Tressady," Mrs. Humphrey Ward's novel, which carries the story into very interesting fields, including an English house party, with delightful glimpses of country life. The editorial department returns to the question of permanent arbitration, with the consideration of its possibilities and the obstacles to it, such as they are. "Patriotism that Costs" is the subject of another editorial, contrasting the true patriotism of the good citizen with that of the "boss" and "heeler," who, in Lowell's phrase, are "slowly but surely filching from us the whole of our

country—all, at least, that made it the best to live in and the easiest to die for." In "Plain Words to Californians" an appeal is made to public spirited citizens of California to support the effort of Mr. John Muir, the Alaska and Sierra explorer, to procure the recession to the United States of the mismanaged Yosemite Valley, so that it may be merged in the Yosemite National Park, which surrounds it, and which under military control has regained its beauty and value as a conservator of the water supply for agricultural regions in the San Joaquin Valley.

The Schoen Pressed Steel Company has just sent out an eight page pamphlet, not standard size, illustrating and describing the pressed steel truck frames which have recently been placed upon the market by this company. The information given in this pamphlet is substantially the same as that covered by the descriptive article upon the Schoen pressed steel car truck which will be found in the RAILWAY REVIEW of March 7, 1896, page 131. The pamphlet is attractive; the paper and letter press are excellent, and the illustrations are unusually good, with the exception that the dimensions on the sectional drawings are rather small.

TECHNICAL MEETINGS.

Semi-annual convention of American Society Mechanical Engineers, May 19 to 22, St. Louis, Mo.

Annual convention Association of Railway Air Brake Men, American House, Boston, Mass., April 14, 1896, P. M. Kilroy, secretary, Pine Bluff, Ark.

Annual convention Master Car Builders' Association, June 17, Saratoga, New York.

American Railway Association, April 15, at Burnett House, Cincinnati, O., secretary, W. F. Allen, 24 Park Place, New York.

Freight Claim Association, May 6, Chicago, Ill. Association Railway Claim Agents, May 27, Monongahela House, Pittsburgh, Pa.

International Association Car Accountants, June 9, Cleveland, Ohio.

Annual convention American Master Mechanics' Association, June 22, Saratoga, New York.

Association American Railway Accounting Officers, May 27, New York City.

Association Railway Telegraph Superintendents, June 17, Fortress Monroe, Va.

American Association General Baggage Agents, July 15, Philadelphia, Pa.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p. m., at the House of the Society, 127 East Twenty-third street, New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The International Irrigation Congress will hold its fourth session at Albuquerque, N. M., September 16-19. Fred L. Alles, secretary, Los Angeles, Cal.; local secretary, W. C. Hadley, E. M., Albuquerque, N. M.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Tuesday in each month, at 8 p. m., at 12 West thirty-first street, New York City.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southwestern Society of Mining Engineers will hold a session at Albuquerque, N. M., September 16-19. Walter C. Hadley, secretary, Albuquerque, N. M.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meeting on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, S. T. Johnston 1522 Monadnock building.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the fourth Wednesday of January, March, April, September and October, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y.

The Technical Society of the Pacific Coast has a monthly meeting on the first Friday in each month at 8 p. m., at the Academy of Sciences building, 819 Market street, San Francisco, Cal.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its informal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The American Society of Irrigation Engineers. Third annual meeting will be held at Albuquerque, N. M., September 16-19. John L. Titcomb, secretary, 36 Jacobson block, Denver, Col.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Engineers' and Architects' Club of Louisville has a monthly meeting on the second Thursday in each month, at 8 p. m., at the Norton building, Fourth avenue and Jefferson street, Louisville, Ky.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumberland Publishing House, Nashville, Tenn.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at the Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Engineers' Club of St. Louis meets on the first and third Wednesdays of each month, at the Missouri Historical Society building, Sixteenth street and Lucas place, St. Louis, Mo.

The Engineers' Society of Western Pennsylvania holds its monthly meeting on the third Tuesday of each month at 7:30 p. m. at the Carnegie Library Building, Allegheny Pa.

PERSONAL.

Mr. W. C. Rowley has been appointed commercial agent of the Michigan Central at Detroit.

Mr. Geo. L. Leiter, late contracting freight agent of the Santa Fe, has been reappointed traveling freight agent of the Cotton Belt with headquarters at Chicago.

General Manager Wm. Green of the Baltimore & Ohio, has selected as his private secretary Mr. E. A. Walton, recently in the office of Vice President King.

Mr. Charles H. Burnett has been appointed purchasing agent of the St. Lawrence & Adirondack Railway, with offices at No. 51 East 44th street, New York.

Mr. G. Ogline of Alliance, O., has been appointed a special detective of the Pennsylvania Company. His jurisdiction will be chiefly on the Erie & Ashtabula division.

Mr. E. W. Cubbison has been appointed traveling freight agent of the Chicago, Akron and Wooster divisions of the Baltimore & Ohio.

Mr. G. W. Cate, of Atlanta, Ga., has accepted the position of local inspector of the Southern Railway & Steamship Association, vice W. A. Huff, Jr., resigned.

Mr. W. J. Duval has been appointed general baggage agent of the Chesapeake, Ohio & Southwestern, vice F. M. Thomas, resigned.

Mr. E. F. Leonard, president of the Toledo, Peoria & Western, on Sunday left for the East to take the position of arbitrator of the Joint Traffic Association.

Mr. C. C. Rosenberg has been appointed signal engineer of the Lehigh Valley Railroad, his office to be at Phillipsburg, N. J. He is to have charge of all the interlocking and mechanical signals.

Mr. J. E. Quick, general baggage agent of the Grand Trunk Lines west of St. Clair river, has been appointed general baggage agent of the entire Grand Trunk railway system with headquarters at Toronto.

Mr. F. B. McKercher has been appointed assistant general manager of the Mexican Central. In addition to his other duties Mr. McKercher will, until further notice, continue those of car service superintendent.

Mr. D. E. McMillan, who for the past eight years has been chief clerk to the general freight agent of the Chicago & Grand Trunk, with headquarters at Chicago, has been appointed general freight agent of the Columbus, Sandusky & Hocking Railroad.

Mr. James W. Musson, manager of the Nickel Plate Line, has resigned, the resignation to take effect on the 15th of this month. He will be succeeded by Frederick L. Pomeroy, who has held several important railroad positions.

Mr. Page Cherry of Newark, O., has been promoted by the receivers of the Baltimore & Ohio to the position of superintendent of the refrigerator car department of the entire Baltimore & Ohio system, with headquarters at Chicago.

Mr. Jos. K. Long has been appointed general foreman of the blacksmith department of the Western New York & Pennsylvania Railway Company at Buffalo, N. Y. Mr. Long was formerly employed in the Juanita shops of the Pennsylvania Railroad, at Altoona, Pa.

Mr. M. Sweeney is appointed acting superintendent of the Choctaw, Cherokee & Kansas City division of the Missouri, Kansas & Texas Railway, vice L. W. Welch, granted an extended leave of absence on account of sickness.

Mr. A. P. Lewis, for many years connected with the Indiana, Decatur & Western Railway Company, the last three years as auditor, died Friday, April 3, 1896, at his residence in Indianapolis, of congestion of the brain. The remains were taken to Litchfield, Conn., for burial.

Mr. DeLos Thomas has been appointed division freight agent of the Norfolk & Western for the Winston-Salem division to fill the vacancy caused by the resignation of Mr. J. R. Ruffin, who succeeds J. J. Archer as division freight agent at Columbus, O.

Mr. C. M. Heald, general manager of the Chicago & West Michigan and Detroit, Lansing & Northern Railroad system, has been appointed receiver of the Detroit, Lansing & Michigan, suit against which was recently begun to foreclose the mortgage.

Mr. Charles Judge, assistant secretary of the Nathan Manufacturing Company since its formation, January 1, 1884, and for many years prior thereto a trusted employee of its predecessors, the firm of Nathan & Dreyfus, died March 4, 1896, at his residence, 238 Ege avenue, Jersey City, N. J.

As was expected at the time of the resignation of Mr. C. V. Lewis from the Big Four in February, he is to be general claim agent of the Baltimore & Ohio, his appointment

to that position having now been announced. Mr. C. H. Maynard is to be commercial agent for the same line with headquarters at Boston, Mass.

Mr. A. H. Johnson, engineer of maintenance of way of the Baltimore & Ohio, has been relieved of duty and has been granted leave of absence until July 1. The office of engineer has been consolidated with that of chief engineer, and Mr. W. T. Manning has taken charge of both positions.

Mr. John Pullen, for several years private secretary to Traffic Manager George B. Reeve, of the Chicago & Grand Trunk Railway, at Chicago, and for the last few years agent of the Reading Despatch, goes to Stratford, Ont., as division freight agent of the entire Grand Trunk system. Mr. Henry Nairn, now chief clerk of the agent of the Great Eastern line at Chicago, will succeed Mr. Pullen as agent of the Reading Despatch at Chicago.

Mr. Joseph P. Crilly, foreman carpenter on the Philadelphia, Reading & New England (Bridge road), has been appointed supervisor in charge of track, bridges and buildings between Silvernails and Campbell Hall, including the Rhinecliff and Hopewell branches, with headquarters at Pokeepsie. Mr. John Farrell is appointed to supervisor in charge of track between Hartford and Silvernails, including the Millerton branch, with headquarters at East Winsted, Conn.

Ms. Thomas O. Barbour, treasurer of the Chesapeake & Ohio Railway, who recently died in a sanitarium at Indianapolis, was born at Rushville, Ind., in 1848. He was educated at the Northwestern Christian University at Indianapolis, and entered railway service in 1869 as clerk for the auditor of the Indianapolis, Cincinnati & Lafayette road, now a part of the Big Four. He occupied various positions on that road until 1888, when he went to the Chesapeake & Ohio, which position he retained until the time of his death.

On April 6 a circular was issued by President Ledyard of the Michigan Central announcing the appointment of Mr. Robert Miller as superintendent of motive power and equipment. Mr. Miller has been with the Michigan Central since 1876. Mr. Richard H. L'Hommiedieu, assistant general superintendent is made general superintendent, and the office of assistant will be left vacant for the present at least. Mr. L'Hommiedieu has been with the road 22 years. Master Car Builder E. D. Bronner is made an assistant under Mr. Miller.

Mr. Julian R. Lane has been appointed general manager of the Macon & Birmingham Railroad. Mr. Lane is one of the youngest railroad managers in the country. He graduated from the University of Georgia in the course of civil engineering, and entered at once the Georgia Southern Railroad shops as an apprentice boy. After finishing his apprenticeship he began firing an engine, and was in a short time promoted to the position of engineer. He was made superintendent of the Macon & Birmingham last year by Receiver Sparks.

President Francis I. Gowen of the Choctaw, Oklahoma & Gulf Railway announces the appointment of Mr. Henry Wood as general manager of the company, with headquarters at South McAlester, with general charge and supervision of the operation of all departments of the company. General Manager Wood announces the appointment of F. A. Molitor engineer of maintenance of way with headquarters at Shawnee, and J. W. Evans as trainmaster in charge of the transportation department with headquarters at South McAlester. The office of general superintendent will hereafter be abolished, the heads of departments reporting to the general manager.

Mr. Stanley S. Patten has joined the staff of the "The Maine Central," the official organ of the Maine Central Railroad Co., and will act as advertising agent in conjunction with Mr. Kimball. Mr. Patten's headquarters will be at the Tucker Printing Co., 105 Exchange street, Portland. Mr. Patten was born in Portland on the 20th of October, 1872, and is the son of the late Edward Patten and a grandson of the late Col. G. W. Stanley of Augusta. He graduated from St. Paul's Hall in 1893, from Phillips Exeter Academy in 1890, and from Hobart College in 1893. For the past three years he has been associated with J. H. Hamlen & Son of Portland.

At the annual meeting of the Chicago Railroad Association held this week the following officers were elected for the ensuing year: President, C. A. Higgins; assistant general passenger agent of the Atchison, Topeka & Santa Fe Railroad; vice president H. A. Bonn, general passenger agent Goodrich Transportation Company; secretary and treasurer A. F. McMillan, chief clerk Michigan Central Railroad; executive committee, C. A. Cairns, assistant general passenger agent Chicago & Northwestern Railroad; F. W. Buskirk, assistant general passenger agent Chicago & Erie Railroad; C. L. Stone, general passenger agent Chicago & Eastern Illinois Railroad. C. A. Higgins held the position of vice president for the year just ended. A. F. McMillan enters upon the ninth consecutive year of his position as secretary and treasurer of the association.

RAILWAY NEWS.

Aransas Harbor Terminal.—The railroad commission of Texas, on March 26, approved and ordered registered by the secretary of state \$24,000 of Aransas Harbor Terminal R. bonds. This is part of the \$250,000 of bonds the commission recently authorized this road to issue.

Atlantic, Suwannee River & Gulf.—This company has a large force at work on the Worthington Springs branch and grading is being pushed as rapidly as possible. This branch starts from the main line two miles west of Tallahassee, and proceeds in a direct line to Worthington Springs, a distance of about twelve miles. Eight miles of the road has been graded. The company is meeting with much trouble in the way of securing a right of way from the farmers.

Cape Fear & Yadkin Valley.—A decision is now rendered in the Cape Fear & Yadkin Valley case by Judge Simonson, and it is in favor of the Baltimore committee and against the New York. These plans were fully outlined

in our issue of January 4—the Baltimore committee demanding that the property be sold as a whole and in its entirety after certain conditions laid down have been complied with, and not in sections or divisions, as was urged by the New York committee. The court decides that the road shall be sold as a whole, unless it becomes impractical to make such sales after certain preliminary questions are considered and passed upon by the court, the principal one of these questions being the value of the divisions and branches, represented by the three series of bonds, known as "A," "B" and "C," and the distribution of the proceeds of sale among the respective holders of the different classes of bonds. To ascertain the value of these divisions and branches, therefore, Judge Simonton has appointed Mr. E. S. Martin of Wilmington, N. C., special master to take testimony on the subject and with reference to certain other statistics, and report the facts to the court for its advisement in rendering its final conclusions as to the sale of the property. It is reported that the Seaboard Air Line will now become the owner of the property.

Cedar Falls & Minnesota.—It is announced that Joseph Sampson, trustee, representing the holders of 90 per cent of the bonds, has entered suit in Bremer county, Iowa, one of the counties through which the road runs, to foreclose the mortgage against the Cedar Falls & Minnesota. This road extends from Waterloo, Ia., north to Mena, on the Minnesota line, a distance of 76 miles. It is thought that as soon as the foreclosure proceeding is accomplished the line will receive new steel and will be built to Charles City, Waverly and other towns from which the present road, owing to the real estate deals attempted by the builders, is a mile or two distant. It is also reported that the ultimate purpose is to build to St. Paul, 115 miles north of its present terminus. The intervening territory is traversed by the Chicago Great Western and the Minneapolis & St. Louis, and the purpose of the proposed extension is purely to share the St. Paul business. Mr. Sampson is acting in the interest of the Illinois Central, which holds the Cedar Falls & Minnesota's entire bond issue of \$1,377,000 except \$75,000. The purpose of the action is to force the holders of the \$75,000 to come to the Illinois Central's terms. The road was built by the Morris K. Jesup syndicate, and in 1867 was leased to the Central at a guaranteed rental of \$113,700 per year. It was bonded for the investment and the bonds were quoted at \$1.15 on the New York market, when the Central, having determined to get possession of the road, attacked the lease, alleging collusion and fraud. Jesup formed a syndicate to protect the bonds, and the United States circuit court at Chicago sustained the lease. The Central took at appeal, which is still pending, and at length acquired the bonds at about 85 cents. With the bonds went the stock, worth about 7 cents.

Chicago, Lake Shore & Eastern.—This company which is one of the half dozen controlled by the Calumet & Blue Island R., and owned by the Illinois Steel Co. has secured an ordinance from the city authorities of Hammond, Ind., to build an extension of its road through that town from the Illinois-Indiana state line at a point on the shore of Lake Michigan to the east line of the city, connecting with the Baltimore & Ohio, and from a point on the Chicago & Calumet Terminal road, where it crosses the Pittsburgh, Ft. Wayne & Chicago, south to the Corning Steel Plant. This plant is also operated by the Illinois Steel Co. The Chicago, Lake Shore & Eastern is now under construction from South Chicago to Clark Junction.

Delaware & Hudson.—The Delaware & Hudson Co., is preparing to double-track its Nineveh branch between Nineveh and Lanesboro. Work will begin as soon as the work of double-tracking between Nineveh and Albany is completed.

Green Bay, Winona & St. Paul.—On April 6, an order was made in the United States circuit court of appeals permitting the sale of the Green Bay, Winona & St. Paul R. to proceed. The road had been ordered to be sold on March 3 by Judge Seaman of Wisconsin, and William S. Mowry, representing \$105,000 of the first mortgage bonds, applied to Judge Showalter two months ago for a supersedeas, which was granted and the sale, which had been set for that date, was abandoned. Mowry says he is entitled to the payment of his bonds out of the proceeds of the sale, the other bondholders prorating what is left. In 1892 all of the bonds were united into a consolidation under a reorganization. Several years later the road defaulted and a foreclosure resulted. Mowry now asserts that his bonds being of the first issue under the old organization, he is entitled to a preference. Judges Woods, Jenkins and Showalter heard the arguments on a writ of supersedeas and directed that the road be sold and out of the proceeds the amount of Mowry's claim be set aside until his contention is heard and decided at the next term of the court.

Illinois Central.—April 3, at a meeting of the board of directors of the St. Louis, Alton & Terre Haute (Cairo Short Line) held at the general offices of the company in St. Louis, that property passed into the control of the Illinois Central R. Co. The transaction is explained in a circular issued to the stockholders of the Cairo Short Line by its president, which states the line has been leased to the Illinois Central for a period of 99 years with the privilege of renewal. This will give the Illinois Central its own entrance into St. Louis. The circular says: "This lease has been made on the express agreeing and guarantee of the said Illinois Central to pay a dividend of 2¼ per cent per annum to the stockholders of this company from January 1, 1896. This first payment will be due July 1, 1896, and semi-annually thereafter."

Kansas City, Pittsburg & Gulf.—This line is now completed five miles beyond Beaumont, Tex., and work is progressing at the rate of one-half to three-quarters of a mile per day. Nearly all the material needed for this work has arrived, and with fine weather this section will soon be ready for the trains. It is the intention to have the road in operation between Kansas City and Sabine Pass by the first of next year. The new roundhouse at Port Arthur is also well under way. The company has filed with the secretary of state of Missouri a statement increasing its capital stock from \$10,000,000 to \$20,000,000.

Norfolk & Western.—The New York reorganization executive committee of the Norfolk & Western road, con-

sisting of L. Fitzgerald, chairman; J. Kennedy Tod, George Coppel, A. A. H. Boissevain, Robert Fleming, C. Sligo De Pothenier and R. F. R. Rubrecht, has, in co-operation with the London and Amsterdam committee, prepared a plan of reorganization which provides for the creation of the following new securities; \$62,500,000 first consolidated mortgage 4 per cent gold bonds, of which \$23,322,675 will be used for disturbed bonds; \$25,986,689 be reserved for the purpose of taking up and paying the disturbed bonds of the Norfolk & Western and the balance for improvements and new acquisitions and of the purposes; \$23,000,000 4 per cent non-cumulative adjustment preferred stock, to be distributed among holders of disturbed bonds; \$66,000,000 of common stock 100-year mortgage bonds will receive 62½ per cent in the new first consols and 75 per cent in adjustment preferred stock. Maryland and Washington division bonds, 70 per cent and 67½ per cent Clinch Valley division bonds, 50 per cent and 70 per cent equipment mortgage bonds of 1888, 100 and 45 per cent debentures of 1892, 100 in adjustable preferred Roanoke & Southern bonds; 55 and 65 Lynchburg & Durham; 35 and 65 Norfolk & Western adjustments mortgage 7s will receive 7 per cent cash, 130 in new first consols and 20 in adjustment preferred stock. Depositors will receive at time of deposit a sum in cash equal to three months' interest on the new first consols to be received by them under the plan, the bonds to bear interest from October 1, 1896. Deposits will be received on and after April 6, and security holders are notified to deposit the same not later than April 10, 1896. Stockholders will receive new common on payment in instalments of \$12.50 per share, deposited as follows: Norfolk & Western preferred, 112½ per cent; common stock, 75 per cent; Roanoke & Southern stock, 75 per cent; Lynchburg & Durham stock, 75 per cent. The Mercantile Trust Co. is the depository of all securities.

St. Joseph & St. Louis—St. Louis, Iron Mountain & Southern.—The suit of the St. Joseph & St. Louis (now a part of the Santa Fe system) vs. the St. Louis, Iron Mountain & Southern which has been in the courts for nearly ten years, and which involved a lease of \$500,000, has been decided in favor of the latter road, in the state supreme court at Jefferson City, thus affirming the decision of the St. Louis circuit court. The case was brought by the St. Joseph & St. Louis Railroad Co. against the Iron Mountain for failure to pay rent and keep the road of the St. Joseph Co. in repair, as agreed in a lease made in 1874 by the St. Joseph Co. to the old Wabash Railroad. The lease to the Wabash was for ninety-nine years, and afterward, in 1883, the old Wabash Co. executed a lease of all roads, including the St. Joseph line, to the Iron Mountain. The principal contention was that the instrument executed by the Wabash to the Iron Mountain operated as an assignment to the Iron Mountain of all the interests of the Wabash in the St. Joseph line, and rendered the Iron Mountain liable on the covenants of the Wabash to repair and pay rents.

St. Louis, Cape Girardeau & Fort Smith.—A 50-year contract has been approved by the bondholders' committee of the St. Louis, Cape Girardeau & Fort Smith R., with the St. Louis Southwestern, the latter road giving trackage rights from Delta, Mo., to Cape Girardeau, and the use of the terminals at that place. The receiver, Mr. Louis Houck, has authorized the issue of \$50,000 worth of bonds for the purpose of relaying the 15 miles of road with new steel rails, and improving the terminal facilities. The foreclosure claims have been delayed on account of litigation over claims of creditors amounting to over \$150,000, which it is sought to place ahead of the mortgage.

Sedalia, Warsaw & Southwestern.—It is announced that the Sedalia, Warsaw & Southwestern R., a narrow gage line running between Sedalia and Warsaw in Missouri, a distance of 42 miles, is to be changed to standard gage and steel rails for the relaying have been ordered. The road is leased by the Missouri Pacific and there has been some talk of extending it to Cross Timbers. Mr. Thomas F. Mitchum is receiver of the line.

South Jersey.—Work is being pushed as rapidly as possible on the new branch from Pittsburgh to Ocean City, and it is expected the line will be finished in time to build up a large summer seashore travel. A committee has been formed consisting of five members, representing the mortgage bondholders, the people who are furnishing capital for the construction of the extension, the Harlan & Hollingsworth Co., which supplied the passenger equipment, the Bethlehem Iron Co., who furnished the steel rails, and one who will, it is said, look after the interests of the stockholders. The contract for grading the first 10 miles is let to Messrs. Edmunds & Miller of Philadelphia, Pa. Mr. M. F. Bozano will have charge of the physical operation of the road.

Tehuantepec Road.—It is reported that a deal has been consummated between Pearson & Son, an English firm, and the federal government whereby the Tehuantepec road is leased to the firm. This road is one of the most important pieces of railway property in the republic and it has been known that several parties had been figuring on the same proposition. It is said that Mr. C. P. Huntington wanted the Tehuantepec to hold over the Panama people, as he has never been satisfied with the existing arrangement with them. The same report which says that Messrs. Pearson & Son has leased the Tehuantepec road, puts the price at something like \$15,000,000, and a long lease. A half million pounds sterling is to be put in replacing the wooden bridges for steel and iron structures, rebalasting the road and putting it generally in good shape. The harbors at Coatzacoalcas and Salina Cruz are also to be dredged, breakwaters put in, and, in short, placed in good condition for traffic.

Tennessee Central.—Work has been recently resumed on the section of the Tennessee Central between Rockwood and Kingston, and the contract for grading between Kingston and Knoxville, a distance of about 42 miles, will be let shortly. The exact date has not yet been determined, as it will depend upon the completion of the road between Rockwood and Kingston. The grading has been entirely completed from Monterey east to Crossville, 21 miles. The new company, organized with the former receiver, Mr. C. O. Godfrey, of Fort Payne, Ala., as president, has undertaken to complete the work east of Crossville to Kingston and Knoxville. It is hoped to complete

the tracklaying to Kingston during June. The work now going on is under contract to C. F. Newton & Co., A. Tubman and Thomas McFarland, whose addresses are Rockwood, Tenn., and Messrs. Ward & Courteney, whose headquarters are at Emory Gap, has taken another of the contracts. The maximum grade is 2 per cent, and the maximum curves are 10 deg. The work includes one tunnel 734 ft. long, about one-half completed, and under contract to be completed June 15. When the track is completed to Kingston, by using the line of the Nashville, Chattanooga & St. Louis to Lebanon and the Nashville & Knoxville east to Monterey there will be a continuous line from Nashville to the Tennessee river. The total length of the new line will be 100 miles and will run via Crossville, Rockwood, Harriman and Kingston. Mr. R. L. Engle of Rockwood is chief engineer.

Waterbury, Meriden & Connecticut River.—In the superior court at New Haven, Conn., on April 4, Judge Prentice granted a motion for foreclosure and sale, under the first mortgage, of the Waterbury, Meriden & Connecticut River Railroad, giving until the third Monday in May for redemption. The company has defaulted the interest on the first mortgage of \$450,000, which is the reason of the foreclosure. There was no opposition and the road will pass into the possession of the New England, and, through it, to the control of the New Haven Co. This is the line which Boston parties some time ago sought to get control of, change to a trolley road, and make in connection with the Meriden trolley road the basis for a large electric system in central Connecticut.

NEW ROADS AND PROJECTS.

Colorado.—The Denver, Cripple Creek & Southwestern R. Co., which was incorporated in Colorado in January last, to build a line from Denver to Cripple Creek, with the intention of extending it to Phoenix, Ariz., and the head of the Gulf of California in the future, has begun surveys for the road under the direction of Chief Engineer Barlow. It is expected that this preliminary survey will be completed by the middle of next month and that the report of Mr. Barlow will be immediately submitted to the directors of the Denver chamber of commerce, that body having promised to aid in the construction of the road. Mr. Cyrus W. Fisher, of Denver, is president of the new line.

Georgia.—According to the Manufacturers' Record, several railway companies have been formed in the south to construct new lines, all of which will be important factors in the railroad facilities in that territory. The South Georgia will build a 25 mile line from Quitman to a connection with the Georgia Southern & Florida. A company at Concord, N. C., consisting of cotton mill owners and others, may build 25 miles of road to connect with the Seaboard Air Line, Manufacturers' & Bankers' at Cleveland, Tenn., propose building a 20-mile railroad to a connection with the Nashville, Chattanooga & St. Louis, while a number of cotton mill owners and bankers at Spartanburg, S. C., have organized to build a railroad to Henrietta, on the Seaboard Air Line.

Illinois.—The St. Louis, Peoria & Northern, the articles of incorporation for which were filed in February, has taken control of the Madison Coal Co. and another small company besides the St. Louis & Eastern, to which the new line is to be an extension. The St. Louis & Eastern has already purchased the North & South of Illinois, running from Mount Olive to Springfield. An extension is proposed from Springfield, north by way of Peoria, to a point opposite Clinton on the Mississippi river, thus forming a junction with the Burlington Rock Island and other roads at Clinton, Iowa, where there is a large market for the coal from the company's mines.

Indiana.—Articles of incorporation have been filed with the secretary of state for the incorporation of the Union City, Richmond & Lawrenceburg R. Co. The length of the proposed road is 81 miles, and the incorporators are Messrs. Charles W. Mackey, of New York; W. N. Page, Oscar E. Evans, J. W. Rowland, J. H. Shoemaker, H. C. Zeigler, W. C. Howe, E. G. Palmer and Hiram Tewksbury. With the exception of Mr. Mackey all are Indiana men residing near the northern terminus of the road. The capital stock is placed at \$200,000.

Massachusetts.—Right of way has been secured by the Philadelphia, Reading & New England R. Co. for the construction of about 18 miles of road between Tariffville, Conn., and Springfield, Mass., where a connection will be made with the Boston & Albany R., and with a little more building another connection can be made with the Boston & Maine. It is said that the reorganization of the company will not be undertaken until some arrangements have been made with the Philadelphia & Reading in regard to the interest on the bonds which was guaranteed by that company.

Mississippi.—The necessity of a railroad running from Mobile in a northwestern direction has been considered for many years by those who are well able to judge and the first active steps taken in this direction were in 1858, when a preliminary survey was made from Mobile to Jackson and then on to the Mississippi river. Soon after this survey and while the gentlemen interested were considering the financial point of the scheme, the war broke out and the matter was dropped, to be taken up again in 1869, when the Mobile & Northwestern R. Co. was formed to build a line of railroad from Mobile to the Mississippi river at Helena, by the way of Jackson. Nearly every town along the road voted aid or subscription to the project and work was begun at both ends of the proposed line. Some 34 miles were completed on the Mississippi end, and is now in operation, while on the Mobile end of the line some 18 miles were partially graded. This effort to build the road through some cause or other failed and the matter has remained dormant until 1890, when another effort was made to build the road, but owing to the panic caused by the Baring Brothers' failure nothing was accomplished. A year ago English and New York capital became interested in the project and they have been completing the survey and getting matters in shape to commence work, provided, however, as per agreement made by the board of directors that they would raise \$250,000 subscription to stock in Mobile and along the

ine of the road. Of this sum the people in Mississippi have nearly completed the amount allotted to them, viz: \$125,000 and the people in Mobile are responding to the call made upon them for their half of the subscription, or \$125,000. As soon as this subscription is raised work will be commenced immediately, but unless the subscription is obtained it is very doubtful if the road is built even now, as the agreement with the capitalists is based upon the subscription by the people to the stock of the company of \$250,000 being raised. The charter history of the railroad commences with the charter granted the corporation known as the Mobile & Northwestern R. Nothing having been done under this charter for nearly 20 years, a charter was taken out both in the states of Alabama and Mississippi in 1888, under the name of the Mobile, Hattiesburg & Jackson R., and in 1889 by acts of legislature the charter was granted, allowing the consolidation of the two proposed corporations into one corporation to be known as the Mobile, Jackson & Kansas City R. The company now owns and has options on very valuable terminals in Mobile, which will afford the best of facilities for the export of lumber and cotton, in which articles the road is bound to do a large business. The road as projected will be one of the best in the south, having only 1 per cent maximum grade and 4 degrees maximum curve. A number of capitalists have already invested largely along the line, and, as soon as they have facilities, will commence the manufacture of lumber, and other industries, all of which increase the wealth of the country through which it passes.

Montana.—Announcement was made April 7 that money had been put in the bank in New York for the completion of the Montana R. This line, if built, will be 65 miles in length, and will connect Helena with the mining camp at Castle in Meagher county. Considerable grading is already done on the line, and the work of laying ties and rails will soon begin. It is announced that cars will be running into Castle by June 15. Castle is the center of a district of immense bodies of lead ores of very low grade, and the completion of the line will at once result in renewed and extended operations in that section. The cost of transportation has heretofore prevented any extensive development at Castle. When the line is done there will be but a stretch of a few miles between its terminus and the end of the Burlington in Montana at Billings, and there will be tempting offers made the latter company to build to Castle and come into Helena over the Montana line. The completion of the road to Castle will be the most important railroad enterprise undertaken in the state this year.

North Carolina.—Reports from Raleigh, N. C., state that the Southern R. is about to extend its lines into the Southern Pines section of that state, hitherto tapped only by the Seaboard Air Line. To this end an extension will be built from Starr to Asheboro, and trains run over a small line already in use for local traffic. The new town of Pinchurst, seven miles from Southern Pines, has nearly one thousand inhabitants, though the first dwelling and one of the several big hotels were completed only a few months ago. These towns are connected by an electric railway just put in operation, and large fruit farms are being laid off. The larger part of the immigration to this section comes from New England, and there is a growing number of visitors seeking climatic relief from bronchial troubles and the country all through here is being rapidly developed.

North Dakota.—A meeting was recently held at Grand Forks for the object of getting a railroad built to connect Duluth with North Dakota. An agreement was reached, it is said, to unite the various projects now in hand in one scheme for a road. The meeting adjourned after deciding to raise \$300,000 to build the roadbed and bridges from Deer river, the terminus of the Duluth & Winnipeg, 100 miles, to within the Polk county boundary line. From there on west they think they can easily get money to build the road. To make up this amount each county represented is expected to obtain donations or cash subscriptions to the extent of seven-tenths of 1 per cent of its 1895 tax valuation, which the delegates say can be done. There were present at the meeting D. W. Hines, president of the Duluth & North Dakota; Halvor Steenerson, president of the Crookston, Red Lake & Pacific; Elias Steenerson, president, and Robert Ray, vice president of the North Dakota & Minnesota Central; E. W. Andrews, president of the Walhalla, Bathgate & Eastern, and thirty-six delegates from the various counties along the line. Mr. Hines says the track and rolling stock will cost \$5,000 per mile, which they expect to raise by bonding the road. Permanent organization is as follows: E. J. Lander, Grand Forks, chairman; H. E. Ives, St. Hilaire, secretary, and L. Ellington, Crookston, assistant secretary.

Ohio.—Two routes are under consideration for a projected electric railway to run from Wheeling, W. Va., to Lake Erie. One is an air line starting at Wheeling, and will pass through St. Clairsville, Newcomerstown, Coshocton, Mt. Vernon, Mt. Gilead, Marion, Marseilles, Dunkirk, Ottawa, then to the lake. The other route starts from Steubenville, on the Ohio river, in Jefferson county, passing through New Philadelphia, Millersburg, Galion, Upper Sandusky, Ottawa, and to the lake. Either line will open a direct outlet for the people in the southwest to get to Chicago and the northwest, which is said to be the main object of the enterprise. As yet not much has been said concerning the project, but it is intimated that a rich eastern syndicate is at the back of it, with the greatest probability that the scheme will be realized.

Mr. Marcus Pollasky, whose negotiations for the control of the projected Columbus, Lima & Northern were mentioned in this column in our issue of March 7, claims to have purchased from the Cambria company, through the Detroit agent, Mr. William F. Jarvis, the rails for 124 miles of track. Mr. Pollasky says he will go to Cleveland next week and while there he will close with the stockholders of the Columbus, Lima & Northern Co. for their property and franchises. He expects to put an engineer on the right of way in a few days, and to begin construction between Lima and Defiance. This roadbed will form a part of his projected Michigan, Ohio & Southern Railway.

Two engineering corps are engaged in surveying a route for a first class railroad to be constructed between

Pittsburgh and Youngstown, Ohio, and it is stated that Senator Brice and Senator Flynn of Pittsburgh are back of the movement, although it has not yet been regularly incorporated. Work of construction will begin within a year. One corps is headed by Engineer Holbrook, formerly general superintendent of the Pittsburgh & Erie. The other is in charge of Engineer Patterson. The new road, it is said, will parallel the Pittsburgh & Lake Erie Railway.

Wisconsin.—It is said that the Chicago & Northwestern R. Co. has decided to construct 90 miles of new road through a timber section of Wisconsin during the coming summer and that the same corporation will arrange at once for a car ferry line across Lake Michigan from Manitowoc, thus opening up still another important cross-lake outlet to the eastern seaboard. If built as projected this new line will pass through the counties of Shawano, Langlade and Forest, and will touch the towns or settlements of Claywood, Breed, Mountain and Farrell, and thence run north through the wilderness to Andrews, where the new line will connect with and cross the Soo. It will then proceed directly north to Iron river, the northern terminus, striking the old peninsular division of the Northwestern system.

INDUSTRIAL NOTES.

Cars and Locomotives.

—The Wisconsin & Michigan Railroad has contracted with the Missouri Car & Foundry Co. for 250 box cars.

—It is understood that the bids for the Baltimore & Ohio cars are to be opened April 15.

—Mention was recently made of an order of 1,000 cars for the Delaware, Lackawanna & Western. It is now stated that the company is to order another 1,000.

—Rumor has it that the Michigan Central will soon be in the market for 2,000 cars.

—The Chicago Great Western is to add 250 50-ft. furniture cars to its equipment.

—The Northern Pacific has determined to build 250 new cars at its Tacoma shops.

—The 100 g. g. hopper bottom cars let by the Pennsylvania Co. to the Wells French Co., Chicago, are to be equipped with the Schoen pressed steel truck and body bolsters. This makes 2,200 cars that this company have equipped with these bolsters.

—The New York, Chicago & St. Louis Railroad is said to be considering the advisability of cancelling its present car leasing system and providing itself with new equipment.

—The business of the Drake & Wiers Co., Cleveland, O., is rapidly increasing, its sales of car roof, for the month of February being five times as large as that of February, 1895. Over 45,000 of these car roofs are now in use.

—A company is about to be formed in Harrisburg, Pa., to manufacture a car seat invented by J. Porter Harris, of Harrisburg.

—The car shops of the Philadelphia & Reading Coal & Iron Co., Schuylkill Haven, which resumed operation on March 26, will probably continue to work throughout the summer and fall.

—The Lenoir Car Co., at Lenoir City, Tenn., has secured a contract for 100 ballast cars to be constructed for the Southern Railway. The company is also figuring on another contract.

—The Detroit & Mackinaw road has placed an order for 60 freight cars with the Michigan-Peninsular Car Co., Detroit.

—The West Shore will build about 250 coal and box cars, to fill vacant numbers.

—The American Railway Equipment Co. has been organized at East St. Louis with a capital stock of \$2,500; to manufacture railway equipment. The incorporators are Robert H. and John B. Murphy and Ernst Mueller.

—The first of three 20 x 24 six wheel switch engines built by the Brooks Locomotive Works have been shipped to the Buffalo Creek Railway. The total weight of these engines is 125,000 lbs. They will be used in placing heavy coal trains on coal trestles in the Buffalo yard.

—The New York, New Haven & Hartford has placed orders for 10 locomotives with the Rhode Island Locomotive Works and thirty with the Schenectady Locomotive Works.

—The Green Line oil tank cars of the Pennsylvania Railroad have been placed with F. M. Pease, 355 Dearborn street, Chicago, Ill., the well known dealer in railway supplies, for disposal. The high standard maintained by the Pennsylvania Railroad is assurance that these cars are in good running order. A large number of 20 ton flat cars, 35 ft. long are also on hand.

—The St. Louis, Vandalia & Terre Haute is in the market for 24 mogul engines.

—The Interchangeable Brake Beam Co. of St. Louis has taken an order for equipping 500 cars for the Wabash Railroad with the new interchangeable beam.

—The Canadian Pacific is reported as being about to add to its equipment 200 to 300 furniture cars.

—The Texas & Pacific is building new chair cars at the Marshall shops to be used on all through trains. These cars will be 68 ft. in the clear, upholstered in the latest style, lighted with pintsch gas and provided with every modern improvement. One of them will be turned out in the course of the next two weeks and others will follow as rapidly as they can be constructed.

—A four-wheeled connected passenger engine is being built at the shops of the Erie Railroad Co. which, it is believed, will haul the fast express over the Susquehanna division in three hours.

—The Seaboard Air Line, which two years ago removed all its wood working shops from Raleigh, N. C., to Portsmouth, Va., will establish woodworking department again at the Raleigh machine shops, where cars will hereafter

be built and repaired for the Raleigh & Augusta and Raleigh & Gaston divisions of the system.

—The shops of the Pittsburgh & Lake Erie, at McKees Rocks, has work enough ahead to keep all hands busy for some time to come. About 10 engines are now in the shops undergoing general repairs, and it is said that 15 other engines will be sent to the shops for a general overhauling. About 100 freight cars are also awaiting general repairs.

Bridges.

—The city engineer of Minneapolis, Minn., has approved the plans of the proposed bridge at that place. As previously stated the bridge will be 100 ft. long and 66 ft. wide, and will be built of iron and steel.

—The Central Iron Works, Harrisburg, Pa., has received several large orders for plates for bridge work. It is now completing a contract for iron plates for two ferryboats for Delaware River work now in course of construction at Chester, Pa.

—The mayor of Atlanta, Ga., has vetoed the contract for the construction of the Jones avenue bridge awarded to the Toledo Bridge Co., at \$16,485, the amount being in excess of the appropriation.

—The contract for building a steel bridge at Holbrook, Huntington, Que., has been awarded to the Imperial Bridge Co., of Montreal.

—It is proposed to build a highway and electric railway bridge at St. Charles, Mo. A. F. Mispagel can be addressed for information.

—The New York, Chicago & St. Louis Railroad has been ordered to build a new draw in its bridge over Black River, at Lorain, Ohio.

—It is proposed to build three new viaducts at 15th, 16th and 24th streets, Omaha, Neb. R. B. Howell, chief engineer.

—Bids will be received until May 4 for constructing a steel bridge over Chaplin river, about a mile east of Dixville, Mercer county, Ky.

—Bids will be received until May 6, by the county commissioners, Fulton county, Ga., for a 180 ft. highway bridge at Atlanta, Ga.

—The Atcheson Coke Co., will offer at public sale on Wednesday, April 15, the Anchor Coke Works, near Dunbar, Pa. The plant consists of 100 coke ovens and equipment, 152 acres of land, from under most of which the nine-foot vein of coal has been mined; mine equipment, consisting of pit wagons, railroad iron, wire rope, haulage engines, boilers, blacksmith shop, mules, harness, carts, etc. There will also be offered for sale the leasehold of 15 acres of good surface land for 950 years, and 12 acres on which are erected nine houses, engine house, shanties, etc. The plant will be sold in whole or in part to suit purchaser. The terms will be made known on day of sale.

—A bill has been introduced into the Pittsburgh councils providing for buying the three toll bridges across the Monongahela river at the following prices: Smithfield street bridge, \$850,000; Point bridge, \$400,000; Tenth street bridge, \$305,000. A board of viewers or commissioners recently fixed the compensation for these bridges at \$1,286,000, \$419,000 and \$350,000 respectively. In case the bridge companies accept the prices named by the ordinance of councils, the city will put a new floor system in the Point bridge to cost \$84,000, and the present wooden structure of the Tenth street will be replaced by a steel bridge to cost from \$60,000 to \$90,000.

—The bids for the construction of the new Melan bridge across the Kansas river in Topeka, were opened last week, and were: Keepers & Thatcher, Detroit, \$125,000; Sooy-Smith & Co., New York, \$142,225; Christie & Son, Chicago, \$144,000; Richardson & Young, Chicago, \$131,960; Willard & Connell, Guthrie, \$144,900; Ulrich Brothers, Manhattan, \$134,000. The award of the contract was deferred, to await the disposition of the bonds voted by the company to build the bridge, an injunction having been filed by Richardson & Young.

Buildings.

—Works for the manufacture of gasoline engines will be constructed at Hickman, Ky., by Folie & Smith.

—The Canton Rolling Mill Co., Canton, Ohio, has made an addition to its main building, making it 110 x 190 ft. A shear house and a wareroom have also been added and two new annealing furnaces have been installed.

—The Norfolk & Western Railroad Co. is having plans prepared for enlarging its grain elevator at Norfolk. The present capacity of the elevator is 100,000 bushels, which is to be increased to 350,000.

—The Pittsburgh Forge & Iron Co. of Wood's Run, Allegheny, is considering building a steel plant to be run in connection with its present establishment, which is principally used for manufacturing railroad supplies. About 1,000 men are now employed.

—The Shiffler Bridge Co., Pittsburgh, is erecting all the structural iron work, for the large addition to the plant of the New Castle (Pa.) Tube Co. The main building, when completed will be 734 ft. in length.

—The plans of the Chesapeake & Ohio for a new passenger station in Richmond, Va., are now so well advanced that work can begin as soon as an adjustment between the company and the city can be made. The plans of the company include the construction of a large station, an elevated road to reach the building, and other new terminal facilities, the estimated cost of all being about \$2,000,000.

—The Louisville & Nashville Railroad Co. is preparing to commence the dock extensions decided upon, and which are to cost about \$150,000.

—The Pennsylvania Steel Refining Co., of Philadelphia, will build a new plant at Greensburg, Pa., the object of the removal being to get cheaper fuel and other raw material. The company has a process of refining open-hearth steel whereby it is made into a tool steel without remelting in a crucible. The new plant will be located near that of the Pittsburgh Tool Steel Co.

—The Gould Coupler Works Co., of Depew, N. Y., will add another large furnace to the foundry. The foundry is

750 ft. long, and the annealing room is said to be the largest in America. The capacity of the Gould forge, which began operations about the first of the year, has been increased by the addition of a steam engine and a pair of shears. For some time it has been in operation night and day.

The Norton Emery Wheel Co., is to build a large new factory on land adjoining that of its present extensive works at Worcester. The new factory will be 233 ft. long by 83 ft. in width, this giving to each floor a superficial area of 19,339 ft. The west elevation will be of three stories and the east elevation of two stories. It will be of steel construction, filled in with brick and glass, and will have a flat roof. The contract for the new factory has been awarded to the Boston Bridge Works, and it is planned to have the new plant in operation by July 1, next. The new structure will be as near fire-proof as it is possible to make it and its construction will embody everybody advantage which the corporation's business experience has in any manner suggested as practicable and desirable. The land is already staked out and work on the excavations will begin at once. The west elevation will be for work rooms, while the east elevation will be occupied by the kilns, which will be the largest for this kind of work in the world. This concern has kept the present plant in operation 13 hours a day since August ast.

Iron and Steel.

The Chicago & Northwestern Railway Co., after seven years practical test, have ordered through H.H. McDuffee, general sales agent, 13,000 truss rail joints for its new double track of 36 miles on the Madison division, to be laid with 80 lb. steel rails.

The Bruce Woodworking factory, Prosperity, S. C., is asking prices on wheels, springs, bar and round iron, etc., for freight cars.

William F. Jones, assistant master mechanic at the Ohio Steel Co.'s plant, Youngstown, O., has resigned to become master mechanic at the Carnegie furnaces at Braddock.

The entire plant of the Tyler Tube & Pipe Co., at Washington, Pa., is in full operation. This concern has under consideration the question of adding a new lap weld furnace to its equipment.

The American Mannesman Tube Co. of Jersey City, N. J., has been incorporated with \$3,000,000 capital. Buffalo, N. Y., will be the principal place of business.

The Texas & Pacific Railroad Co. will commence work soon on its new grain elevator at Westwego. The present elevator will be greatly improved, as will also be other facilities.

The Falcon Iron & Nail Co., of Niles, O., will soon commence the erection of a brick and iron warehouse, which will be 60 x 150 ft. in size.

The Lehigh Valley Railroad Co. is reported as about to remove its Cortland, N. Y., repair shops to Sayre, N. Y.

The New Orleans & Western Railroad is contemplating the construction of 1,000 ft. of wharfage.

Plans have been prepared for a new passenger station at Bennington, Vt., to cost \$20,000 for the Bennington & Rutland Railroad.

The Boston & Maine is to erect a freight house at Mystic wharf near Chelsea bridge, Boston, 170 ft. wide, 800 ft. long and 25 in. high.

The Denison & Washita Valley Railroad has appropriated \$100,000 for the erection of a roundhouse and other improvements at Denison, Tex.

Referring to the appointment of Willard Sawyer and John Bacon as appraisors of the property of the assigned Glendon Iron Co., an Easton, Pa., telegram says: "The company has expended close to a million dollars on the plant. The liabilities are about \$250,000. The company in the seventies stood at the top notch of pig iron producers and assisted materially in giving Lehigh Valley its name for iron output. There are now only two companies in existence among those which contributed to this fame that have not either assigned or gone into the hands of a receiver—the Thomas Iron Co. and the Bethlehem Iron Co., both among the strongest concerns in the valley."

The board of directors of the Tennessee Coal, Iron & Railroad Co. of Birmingham, Ala., has appointed a committee of three to take steps toward building a steel plant to cost \$1,000,000, and it is stated that all the money has virtually been pledged by capitalists interested in the Tennessee Coal & Iron and the Sloss companies and the Southern and the Louisville & Nashville Railroads. The plant will manufacture rails and all forms of merchant steel, and as all the materials used are produced in the neighborhood, it is estimated that the products of the mill can not be undersold throughout the south. The mill will obviously give a decided impetus to industrial activity in Birmingham. The decision to establish a steel plant at Birmingham is the outcome of a discovery recently made that low silicon iron, well suited for steel-making by the open hearth basic process, can be produced from ordinary red Alabama ores. Large orders for this iron, which is now being made at the Alice furnaces in Birmingham, have been received from the Carnegie and the Illinois Steel companies.

Machinery and Tools.

The Brown Hoisting & Conveying Co., of Cleveland, O., has recently supplied the Battle Creek, (Mich.) Steam Pump Co. one of its standard overhead tramrail systems of one ton capacity, including switches, curves, roller bushed trolleys equipped with triplex blocks, etc., and a light pulley block traveling crane. The company has also sold an extensive 2-ton tramrail system, including turntables, etc., to the Detroit Dry Dock Co., for the new shops in the shipyards at Wyandotte, Mich.

The Foster Engineering Co., of Newark, N. J., in addition to other current business, has just received orders as follows: For 58 reducing valves to be applied to the heating and water system of the new Manhattan hotel at Forty-second street and Madison avenue, New York; 23 valves for Vienna, Austria, and a full line of its pressure regulators and pump governors for England; 24 valves

for the U. S. gunboats 8 and 9, from the Newport News Shipbuilding & Dry Dock Co.; 6 valves from the Globe Iron Works Co., Cleveland, Ohio, for the U. S. revenue cutter service; two 5-in. automatic safety stop valves for the U. S. battleship Texas; one 5-in. valve for steering engine of the U. S. cruiser New York, an 8-in. and a 12-in. valve for textile mills, besides a large number of valves for regulating carbonic acid gas pressures in soda water fountains and like service. In addition to this, it has on file orders from railroad companies for its inside safety boiler check, air-brake pump governor, and valves for the steam heating of trains. All this indicates live business and taxes the facilities of its factory, which it has recently enlarged by the addition of an assembling and testing room and pattern shop.

Albert Waycott & Co., of St. Louis, sold two 55-ton engines last week for Richmond Locomotive & Machine Works. They will be shipped to California, all rail route.

The new mechanical laboratory now being completed for the New Mexico College of Agriculture and Mechanic Arts, at Mesilla Park, N. M., is worthy of special mention. The Board of Regents has appropriated a liberal sum for additional equipment. Besides a steam heating plant, these additions will consist of one 30 horsepower automatic engine for service and experimental purposes; one 40 horsepower boiler, feed water heater and purifier, duplex boiler feeder, steam separator, indicator, etc. Also two engine lathes, one of 16 in. x 6 ft., and one 14 in. x 8 ft.; one 24 in. x 24 in. x 6 ft. planer; one 12 in. shaper; one No. 1 milling machine; one emery grinder, with wheels for wet and dry work; one 22½ in. power drill, pulleys, shafts, belts, etc. Also two wood lathes—one of 12 in. x 6 ft. (plain), one pattern makers' lathe 18 in. x 10 ft.—both lathes having iron shears; one scroll saw; one 20 x 6 in. top roll planer, with knife grinder; one 1-ton cupola furnace, and a large order of small tools and machine attachments. F. W. Brady is professor of engineering.

Edward J. Gardner and L. R. Breeneman have been appointed receivers of the Carlisle Manufacturing Co., of Carlisle, Pa. Previous to the appointment of receivers a judgement for over \$74,000 had been secured by one of its creditors. So one of the departments of the plant are still running and it is expected that a readjustment of the company's finances will be made within a short time.

Mr. Henry F. Hill, formerly with Hill, Clarke & Co., Boston, Mass., has gone into business on his own account as a dealer in machinery at 123 Oliver street, Boston, Mass.

The order secured by the Westinghouse Machine Co. for the vertical cross compound engines of 1,600 horsepower each for the Allegheny county light station, Pittsburgh, was for four engines instead of three, as noted in our issue of last week.

The Pennsylvania Railroad has ordered from the Norwalk Iron Works Co., of South Norwalk, Conn., one 10x12 in. air compressor for use at the shops of the company at Wellsville, Ohio. At the present time the Pennsylvania has 20 Norwalk compound air compressors in use in shops upon its lines.

The E. P. Allis Co., Milwaukee, Wis., has recently secured the contract to equip the Canal & Claiborne Street Railway, New Orleans, La., with two 450 horsepower tandem air-pump condensing engines with Reynolds independent air pump condensers. The engines and condensers will be equipped with the most modern devices for safety and economy, and will be direct coupled to General Electric Co.'s generators.

The Whitney Manufacturing Co., Hartford, Conn., recently organized, with Clarence E. Whitney president and manager, and Charles S. Whiting, secretary and treasurer, has acquired by purchase the business, tools, machinery, etc., of the Woodruff Manufacturing Co., that city, and will continue the manufacture of all the machines and specialties heretofore made by the latter concern, and will add to the line immediately. The Whitney Manufacturing Co. will for the present occupy about 12,000 ft. of floor space in Colt's West Armory and is rapidly getting into shape to do a large business. Among other specialties it intend to make countershafts, loose pulleys, etc., equipped with the Hyatt patent roller bearings, for which it are selling agents.

The Pedrick & Ayer Co., of Philadelphia, has designed and built two special multiple-spindle drills for the Westinghouse Air Brake Co., of Pittsburgh, intended exclusively for boring brake cylinders.

Miscellaneous.

The New York offices of the New York Belting & Packing Co., Ltd., will be removed about May 1, to 25 Park place and 22 Murray street.

Toledo manufacturers are nothing if not enterprising. Not content to depend upon the facilities offered by the railroads they have built an independent railroad of their own. The first trip over it was made on the evening of April 1. Alex. Backus, president Vulcan Iron Works, is president of the road, and Mr. W. H. A. Read, is secretary-treasurer. The road reaches several industries. It will be used only at night as it is designed for switching purposes only.

A new and interesting car seal which aims to be both efficient and cheap has recently been brought out by the Universal Car Seal Co. of St. Louis. The feature that will strike most railway men as most novel is that the seal at present is made of a cheap grade of glass. If it is tampered with and broken, it is necessarily beyond hope of repair. It can be made of practically any size, shape or color, or marked in any desired manner to suit the requirements of different roads, the marking in some instances including station numbers in addition to the initials of the road and its consecutive number. One of the important claims made for the device is that no tools are required for either sealing or unsealing, the locking pin providing for all the requirements in this line.

Proposals will be opened April 30 by James B. Quinn, 349 Carondelet street, New Orleans, La., for the hire of a dredge for improving Bayou Lafourche.

The Bucyrus Steam Shovel & Dredge Co., of South Milwaukee, Wis., has recently sold a large number of improved heavy steam shovels to the ore companies in the

Lake Superior country, among which are the Pittsburgh & Lake Angeline Iron Co.; the Cambria & Lilly Mining Co. of Negaunee; the Penn Iron Mining Co. of Vulcan, and the Newport Mining Co. of Ironwood. The Minnesota Iron Co. has also contracted for two large shovels to be delivered in May and June, and the Mahoning Ore Co. has bought a duplicate of the 60 ton shovel which it purchased last season, and which made a remarkable record in the heavy hematite which it mine. The last named shovels will be used not merely to handle, but to mine the ore. There have also been recent sales to the Wisconsin Central, the Chicago, St. Paul, Minneapolis & Omaha, and to Winston Bros., contractors on the Northwestern.

The Detroit Graphite Manufacturing Co. has been having a series of service tests made of its graphite paint for wear and for resistance to severe climate. The first report is from the captain of the steamer Moran as follows: "It stands wear and weather better than anything I have ever used on my decks."

Bids are asked by Maj. H. M. Adams, United States engineers, until April 27, for dredging in the Connecticut river and Housatonic river.

The Standard Railway Signal Co. has filed articles of incorporation in New Jersey. Headquarters will be at Rahway, and the company's capital is placed at \$300,000. The company will manufacture interlocking apparatus and signals of all kinds for railroads. The incorporators are: Hilda M. Johnson, John M. Randolph and Wm. B. Wells, all of Rahway, N. J. The president of the company is Mr. Henry M. Johnson, late general manager of the Johnson Railroad Signal Co., and the vice president is Mr. John T. Cade, for many years with the Union Switch & Signal Co. Both these gentlemen have in past years taken out a number of patents in the signaling field, and the new company will also have the exclusive use of the patents of Arthur H. Johnson. Mr. Henry Johnson has been intimately connected with railroad signaling from its infancy. He was for many years with Stevens & Sons of London, then with Saxby & Farmer, with both of which firms he held important positions. He was for some time superintendent of signals on the Lancashire & Yorkshire. Mr. Cade has been eastern superintendent for the Union Switch & Signal Co. for many years.

Plans and estimates have been submitted to the river and harbor committee at Washington for improvements in the harbor at Cleveland, Ohio, to cost \$806,000. The work consists of renewing cribs, widening channel and repairing breakwater.

Burnt clay ballast is to be used on the Chicago, Rock Island & Pacific Railway and the Edwards & Walsh Construction Co. of Davenport, Iowa, is reported to have secured a contract for digging and burning 20,000 cu. yards near Ladora, Iowa. The first work will be the grading for the necessary side tracks.

Mexico dispatches states that the English contracting firm of S. Parson & Sons has secured the National Railroad, in Tehantepec, on lease, with a contract to repair the road and to improve the ports of Coatzacoalcas and Salina Cruz. The contract involves the expenditure of fully \$15,000,000.

Mention has already been made of the negotiations which for several months have been under way looking to the formation of a large concern to engage in the manufacture of Fox pressed steel trucks, as well as other forms of pressed steel which enter into the construction of railroad equipment. These negotiations have been successfully consummated, resulting in the formation of the Fox Pressed Steel Co., composed of New York and Pittsburgh capitalists, whose plant will be located in Pittsburgh. Ample capital has been provided and the concern has purchased five acres of ground on the line of the Allegheny Valley Railway, near Fifty-second street, and the work of erecting the plant will be commenced at once. The contract for the erection of the buildings and also for the machinery has been let to Mackintosh, Hemphill & Co., of Pittsburgh. This firm will push the work to completion as rapidly as possible, and the new concern expects to be turning out the Fox pressed steel truck about October 1 next. The plans as prepared by Mackintosh, Hemphill & Co. are very elaborate and call for a main building 450 ft. long by 112 ft. wide. Included in the equipment of this building are 6 power shears, 8 hydraulic presses, 2 bending machines, 11 hydraulic punches, 7 power punches, 24 hydraulic riveting machines, 16 hydraulic cranes, 5 electric cranes and the necessary straightening tables and other smaller tools. The entire equipment will be of the most modern design. In another building, 350 x 60 ft. plans for which have also been prepared, will be located the machine shop, blacksmith shop, pump house, boiler house, electric light plant and a small building to contain the gas producers, as it is the intention to use producer gas for fuel. The location selected for the plant is an admirable one, as the facilities for receiving and shipping material will be all that could be desired. Cars will run right into the building on a private track and will be loaded and unloaded by overhead electric traveling cranes. The plant will be so constructed that the raw material will be received at one end, put through the various processes of manufacture and loaded on cars at the other end, thus preventing unnecessary and costly rehandling. The entire plant has been admirably designed, and when in full operation is expected to turn out from 300 to 400 finished trucks per day and to give employment to from 1,000 to 1,200 men. There are now about 60,000 Fox trucks in use and the demand is constantly increasing. The material for the construction of these trucks will be principally supplied by the Carbon Steel Co., of Pittsburgh, and will conform in quality with the specifications of that used by the Fox Solid Pressed Steel Co., of Joliet, Ill. It is the opinion of many able and experienced railroad men that the Fox pressed steel truck frame will become the standard truck of this country, and there is no question but that where adopted it will materially reduce the operating expenses of the road by minimizing the wear and tear of both rails and wheel flanges, and by the perfect working of the truck, thus avoiding all unnecessary friction to all parts of the train. As already stated, the Fox Pressed Steel Co. will manufacture all forms of pressed steel that enter into the construction of railroad equipment, in addition to the steel truck.